

Department of

Mechanical & Industrial Engineering



Annual Report 2005-2006



Concordia
UNIVERSITY



Concordia
UNIVERSITY

Department of Mechanical & Industrial Engineering
Faculty of Engineering and Computer Science

Annual Report 2005-2006

Dr. S.V. Hoa
Department of Mechanical and Industrial Engineering
1455 de Maisonneuve Blvd. W., EV004.139
Montreal, Quebec, Canada H3G 1M8
Tel.: (514) 848-2424, ext. 4190
Fax: (514) 848-3175

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CHAIR'S REPORT

Suong V. HOA
Professor and Chair
2003-2006



During the academic year 2005-2006, the Department has made significant achievements in many areas. These are summarized below:

Programs:

- The two graduate programs in Industrial Engineering: Master of Applied Science in Industrial Engineering and Master of Engineering in Industrial Engineering were approved by CREPUQ. The approval was rapid; thanks are extended for the excellent work done by Dr. Demirli and members of the Industrial Engineering group in the Department in the preparation of the dossier. The program is now scheduled to be offered beginning September 2006.
- The comprehensive examination for the Ph.D program underwent significant modifications to improve the pace of progress of the students and also to enhance the quality of the exam. The comprehensive exam now is more streamlined; this helps the students to be better prepared for the exams. It also leads to a more uniform standard between the different groups of research in the department. These improvements are in a large part due to the efforts of the Graduate Program Director Dr. I. Hassan.
- Many modifications were made to the mechanical engineering undergraduate program. The options have been strengthened. Also a new lab called "Anatomy of Mechanical Engineering" has been introduced into the program. This lab gives students the opportunity to dissect real life mechanical engineering components to learn how the different parts are put together. Thus this lab assists the students in the visualization of mechanical parts, and helps them to better appreciate the content of courses to follow. Much credit is due to the Undergraduate Program Director Dr. M. Pugh.
- The undergraduate program in Industrial Engineering has been strengthened with more courses in Industrial Engineering.
- The improvement in the undergraduate programs paid off well upon the Canadian Engineering Accreditation visit in November 2005; comments from the visitors were very encouraging.

Teaching:

- The new approach for teaching the capstone design project has worked very well. The capstone design project team of faculty members for the 2004-2005 academic year had presented a paper on the new approach at the CDEN (Canadian Design Engineering Network) in Calgary in July 2005. The capstone design projects in the 2005-2006 year are excellent. The atmosphere during the poster presentation held in April 2006 was boisterous. One project of Mechanical Engineering students Davide Prella and Alessandra Pollifrone, the Micro Air vehicle, won the first prize in the nation-wide student design competition held during the CSME (Canadian Society for Mechanical Engineering) Forum in Kanaskakis, Alberta held in May 2006.
- The Department has cooperated enthusiastically with the initiative from the Associate Dean of Undergraduate Studies Dr. W. Lynch in the introduction of a set of skills to be incorporated into the courses in the program. These sets of skills should bring into sharper focus the need for skill development in the courses, in addition to the acquisition and retention of knowledge.

Research:

The Department continues to do well in research.

- Dr. Packirisamy received a contract of more than a million dollars to work on the implementation of a patent that he had received.

Many professors in the Department receive large grants and contracts for collaborative work with industries, such as:

- Grants and contracts from CRIAQ and NSERC CRD (Drs. N. Bhuiyan, C. Chen, K. Demirli, S. Hoa, H. Hong, R. Ganesan, M. Medraj, M. Paraschivou, I. Stiharu);
- From Pratt & Whitney (Drs. M. Chen, N. Esmail, I. Hassan, H. Hong);
- From IRSST (Dr. Rakheja);
- From Networks of research such as AUTO 21 (Drs. K. Demirli, R. Ganesan, S. Hoa), ISIS (Dr. S. Hoa), CREPEC (Drs. M. Chen, N. Esmail, R. Ganesan, S. Hoa, M. Medraj, M. Pugh, P. Wood Adams), and NanoQuébec (Drs. S. Hoa, M. Medraj, M. Pugh, P. Wood Adams).

Honours, Awards and Prizes:

- Dr. N. Esmail was inducted to be Fellow of the Engineering Institute of Canada.
- Dr. S. Hoa was invited to give a plenary address at the annual meeting of the American Society of Composites.
- Dr. S. Rakheja was awarded the title of Concordia Research Fellow for 2005.
- Leslie Hosein, Dainius Juras, Sophie Merineau, Sabrina Poirier, Maureen Thuringer, Petre Tzenov, Charlene Wald and Arlene Zimmerman received the Staff Recognition awards.
- Alessandra Pollifrone and Davide Prella (final year undergraduate ME students) won first prize in the CSME design competition held at Kanaskakis, Calgary in May 2006 for their Micro Air Vehicle project.

- The Concordia student chapter of the Canadian Society for Industrial Engineering won several awards at the 2006 CSIE conference in Halifax: Third prize in Engineering competition, Recipient of the Robert F. Moore award, and the Golden I. Award.

Events:

- The Research Day event continued with rigor this year. The graduate student competition was well attended and received much enthusiastic response from the students.
- The capstone project poster exhibition was a great success. The students were very enthusiastic and the projects are of excellent quality.
- The Design and Awards Day event was also a great success. This event gave everybody (professors, staff and students) a very good feeling about belonging to our department.
- Dr. S. Hoa has been co-chair of the 6th Canada-Japan workshop on Composites, to be held in Toronto in August 2006.
- The offices of the professors, office staff and graduate students, along with the research labs of the Department, moved to the new building (the EV building) in May 2005. The past year has allowed time to make the adjustments into the new surroundings.

Personnel:

- Maureen Thuringer took maternity leave from October 31, 2005.
- Tina Lomma joined the Department as Department Administrator in January 2006.
- Nadia Bhuiyan took maternity leave from May 2006.
- Drs. I. Stiharu and M. Chen are promoted to full professor effective June 1, 2006: congratulations!
- Drs. M. Packirisamy and M. Medraj receive early promotion to Associate Professor effective June 1, 2006: congratulations!
- Drs. P. Wood Adams, R. Sedaghati, and J. Darghahi receive their tenure effective June 1, 2006: congratulations!
- Jayne Claassen moved from Assistant to the Chair to Assistant to Director of CIADI.
- Sophie Merineau was promoted to Assistant to the Chair of the Department: congratulations!
- Sabrina Poirier was promoted to Undergraduate Program Assistant: congratulations!
- Dr. I. Jasiuk left the Department in January 2006.
- Mrrs. Peter Sakaris, Tianhe Wen, and Brian Cooper left the department in March 2006.
- The term of office of Dr. S. Hoa as Chair of the Department finished on May 31, 2006. Dr. M. Pugh is the new Chair effective June 1, 2006.

Overall, I think that the Department had a successful year of operation. In the face of constant changes and challenges, the Department has adapted and has taken advantage of the opportunities presented by these changes and challenges.

It has been a pleasure serving the Department in my capacity as Chair for the past three years. I thank all faculty and staff members for the cooperation extended to me during this time. I wish you all the best.



PERSONNEL

CHAIR AND PROFESSOR

S.V. Hoa

(from June 1, 2003 to May 31, 2006)

Ph.D. (Toronto), Eng.
Concordia Research Chair in Materials and Composites Tier I.
Director of the Concordia Centre for Composites. Composite Materials and Structures, Materials Development, Testing and Evaluation, Non-Destructive Testing, Analysis and Design, Nanocomposites.

ASSOCIATE CHAIR AND ASSOCIATE PROFESSOR

M. Chen

(until May 31, 2006)

Ph.D. (Manitoba)
Manufacturing System Analysis and Design, Reverse Supply Chain, Quality Improvement, Service System Optimization.

PROFESSORS

A.K.W. Ahmed

Ph.D. (Concordia)
Road and Railway Vehicle Dynamics, Vibrations and Control, Intelligent Vehicle Systems.

R.B. Bhat

Ph.D. (I.I.T. Madras)
Associate Dean, Graduate Programs and Research, 2003-2008
Random Vibrations, Rotor Dynamics, Structural Acoustics, Dynamics of MEMS Devices.

N. Esmail

Ph.D. (Moscow State)
Dean, Faculty of Engineering and Computer Science, 1997-2008.
Fluid Mechanics and Rheology, Liquid Coating Processes, Pulp and Paper, Micro-fluidics.

I. Jasiuk

(joined June 2004; resigned Dec. 31, 2005)

Ph.D. (Northwestern)
Micromechanics, Mechanics of Materials (Composite Materials, Nanocomposites, Biomaterials), Bone Mechanics, Elasticity, Fracture.

S. Rakheja

Ph.D. (Concordia)
Research Chair in Vehicular Ergodynamics tier I.
Vehicle Dynamics, Vehicular Ergodynamics, Vibration Control, Seating Dynamics, Human Vibration.

G.H. Vatistas

Ph.D. (Concordia)
Library Representative.
Fluid Mechanics, Vortex Dynamics, Flow Instabilities, Computational Fluid Dynamics, Experimental Aerodynamics, Lubrication, Microgravity Fluid Mechanics, Thermodynamics, Haemodynamics, Numerical Methods.

DISTINGUISHED PROFESSORS EMERITI

R.M.H. Cheng

Ph.D. (Birmingham)

Microprocessor Control of Mechanical Systems, Fluid Control Systems, Robotics, Automatic Guided Vehicles, Camera Vision, Computer-Aided Manufacturing and Inspection.

S. Lin

Dr. Ing. (Karlsruhe), Eng.
Heat and Mass Transfer, Fluid Mechanics, Similarity and Modelling in Engineering Systems.

H.J. McQueen

Ph.D. (Notre Dame), Eng.
Hot working of metals with respect to dependence of ductility, softening and microstructure evolution on temperature and rate of straining. The materials include Mg alloys, Al alloys and composites, and HSLA, stainless and tool steels.

M.O.M. Osman

Dr.Sc.Tech (Swiss F.I.T.), Eng.
Machine Tool Dynamics, Cutting Force Sensors in Metal Cutting, Expert Systems/Adaptive Control in Deep Hole Machining, Surface Mechanics, Tribology, Robotics, and Power Transmissions.

PROFESSORS EMERITI

V.N. Latinovic

D.Eng. (Concordia)

Representative - Society of Manufacturing Engineers (SME). Computer Aided Manufacturing, Production Engineering, Design and CAD.

ASSOCIATE PROFESSORS

A.A. Bulgak

Ph.D. (Wisconsin)

Lean Manufacturing Design and Analysis of Environmentally Responsible Manufacturing Systems; Supply Chain Network Design: integration of "Quality" and "Reverse Logistics" in Supply Chain Design; Postponement Theory, Analysis of Rescheduling Periods on Supply Chain Performance Robust Design; Optimization of Manufacturing Systems through Metamodeling, Simulation, Stochastic Optimization; Modeling, Performance Evaluation, Design Optimization, and Economics of Call Centers; Stochastic Optimization; Quality and Productivity Improvement, Airline Revenue Management Problems (Financial Options in Airline Reservation Systems); Design

Optimization/
Improvement of Civil
Aviation Networks.

K. Demirli

Ph.D. (University of Toronto), P.Eng.

Fuzzy logic-based reasoning and its application to manufacturing cells and autonomous mobile vehicles; operations research.

R. Ganesan

Ph.D. (Indian Institute of Science, Bangalore, India)

Concordia Research Chair Tier II in Composite Machine Components. Boundary Element Method, Vibrations and Machine Dynamics, Composite Materials and Structures, Stochastic Processes in Materials and Mechanics, Random Vibrations.

W.S. Ghaly

Ph.D. (MIT)

Aerodynamic Optimization, Inverse Blade Design, High Speed Aerodynamics, Convective Heat and Mass Transfer, Indoor Air Quality.

G.J. Gouw

Ph.D. (Queen's), Eng.

Human Factors Engineering, Ergonomics, Safety.

I.G. Hassan

Ph.D. (Manitoba University)

Graduate Program Director (until May 31, 2006). Micro Fluidics, Thermal MEMS, Heat Transfer, Multiphase Flow, CFD and

DSMC Applications.

H. Hong

Ph.D. (Concordia)

Magnetic-core Solenoid Operated, Voice Coil Operated, and Piezo-actuator Operated Vehicular Variable Valve Actuation and Alternative Fuel Injectors.

M. Paraschivoiu

Ph.D. (M.I.T.)

Computational Fluid Dynamics, Large Eddy Simulations, Hydrogen Energy, Wind Energy.

M.D. Pugh

Ph.D. (Leeds) P.Eng. (Ont.)

Undergraduate Program Director (until May 31, 2006).
Materials, Composites, Microstructure-processing-property Relationships.

I.G. Stiharu

Ph.D. (Bucharest)

Director, CONCAVE. Micromachining and Micromechanics, Micromechatronic Devices, High Precision Mechanics, Dynamical Design and Manufacturing, Microtribology and Tribology, Nonconventional Lubrication Methods, Microsensors (Acoustic, Acceleration, Pressure, Humidity), Intelligent Vehicle Systems, Vehicle Dynamics, Human Vibration, Vehicle Ride and Handling, Direction Stability and Control, Vibration Control.

**ASSOCIATE
PROFESSORS
EMERITI**

K.I. Krakow

M.S. (CalTech), Eng.

Heat Pumps, Environmental Control, Solar Energy, Air Conditioning Systems.

R.A. Neemeh

Ph.D. (McGill), Eng.

Shock Wave Physics and Related Phenomena, Unsteady Wave Motion in Compressible Flow, Fluidic Igniters, High Speed, Aeroacoustics.

**ASSISTANT
PROFESSORS**

A. Akgunduz

Ph.D. (University of Illinois at Chicago)

Virtual reality based product design; Customer Assessment; Customer Assessment for Product Design; and Revenue Management in Airline Industry.

N. Bhuiyan

(on maternity leave since May 2006)

Ph.D. (McGill University)

Operations management, particularly in new product development processes. Research related to operational issues dealing with the design, development, production, and distribution of goods and services, with a focus on emerging tools and techniques in

product/process design and development, design and manufacturing technologies, lean information management, and methods for integrating design and manufacturing to improve process performance.

Z.C. Chen

Ph.D. (University of Victoria)

CNC Machining, Computer-aided Design, Machining Intelligence.

J. Dargahi

Ph.D. (Glasgow C.U.)

Smart Sensors and Systems, Sensors and Actuators, Tactile Sensing, Micromachining, Medical Robotics, Robotic Sensors, Haptic Sensing and Feedback Systems, Teletaction in Minimally Invasive Surgery.

A. Dolatabadi

Ph.D. (Toronto)

Computational Fluid Dynamics, Two-phase Flows, Thermal Spray Coatings, Liquid Spray and Atomization, Microfluidics.

B.W. Gordon

Ph.D. (M.I.T.)

Distributed Simulation, Distributed Control Systems, Control of Internal Combustion Engines, Telerobotics, Mobile Robots, Unmanned Aerial Vehicles (UAVs), x-by-Wire Control Systems, Virtual Environments, Real-time Systems and Network Communication.

M. Medraj*Ph.D. (McGill)*

Light Metals, Magnesium Alloys Development, Metal Matrix Composites, Computational Thermodynamics, Phase Diagrams, Nanostructured Materials.

Sivakumar**Narayanswamy***Ph.D. (Nanyang**Technological University, Singapore)*

Canada Research Chair Tier II.

Laser Metrology – Laser interferometric measurement of Surface profile, Vibration, and sub-surface defect detection. Laser Micromachining – Direct laser ablation using interference principle for reduction of feature size, 2D and 3D photonic devices fabrication.

M. Packirisamy*Ph.D. (Concordia)*

MEMS, Microfabrication, Optical Microsystems, Dynamics of Microsystems, Fuzzy System Identification.

L. Rodrigues*Ph.D. (Stanford University)*

Switched, hybrid and optimal control with applications to aerospace (especially unmanned vehicles), automotive, manufacturing and biological systems (especially the vocal tract).

R. Sedaghati*Ph.D. (Victoria)*

Co-op Program Director (until May 31, 2006). Adaptive Structures and

Vibration Control using Smart Materials, Structural Design Optimization and Computational Mechanics (Finite Element Method), Force Limited Vibration Testing, Piezoelectric Laminated Composites, Design Optimization of Thin-Walled Composite Structures, Design and Modeling of Piezoelectric Sensors and Actuators.

K. Siddiqui*Ph.D. (Toronto)*

Fluid Mechanics, Heat Transfer, Wave Dynamics, Acoustics.

P. Wood-Adams*Ph.D. (McGill)*

Polymer Structure – Property Relations, Polymer Dynamics, Polymer Rheology, Thin Films, Surface Science, Rheometry, Physical Characterization of Materials, Atomic Force Microscope, Nano-indenter, Crystallization.

W.F. Xie*Ph.D. (Hong Kong Polytechnic University)*

Nonlinear Control in Mechatronics, Active Control of Vehicle Shimmy, Model Predictive Control, Induction Motor Control, Visual Servoing and Tracking, Soft Computing Techniques- Fuzzy Logic, Neural Networks and Genetic Algorithm.

ADJUNCT PROFESSORS

F. Aghili*Ph.D. (McGill)*

Canadian Space Agency

P.-É. Boileau*Ph.D. (Concordia)*

Institut de recherche en Santé et en Sécurité du Travail du Québec

C.-K. Jen*Ph.D. (McGill U.)*

National Research Council of Canada

M.R. Loewen*Ph.D. (U. of Alberta)*

Massachusetts Institute of Technology

H. Moustapha*Ph.D. (McMaster)*

Pratt & Whitney Canada
Director, CIADI,
Concordia.

M.J. Richard*Ph.D. (Queen's U.)*

Université Laval

ADJUNCT ASSOCIATE PROFESSORS

A. Georgantas*Ph.D. (Concordia U.)*

Pratt & Whitney Canada

E.V. Konopleva

Ph.D. (Priazovsky State Technical University, Mariupol, Ukraine and Mariupol Metallurgical Institute, USSR)

MDS Prad Technologies Corporation, Ville St. Laurent, Québec

N.D. Ryan

Ph.D. (Concordia)
Consultant on hot working
of stainless steels

M.-T. Ton-That

*Ph.D. (U. of Innsbruck,
Austria)*
Industrial Materials
Institute, National
Research Council of
Canada

ADJUNCT ASSISTANT PROFESSORS

I.L.M. Ahmed

N. Aouf
Ph.D. (McGill)
National Research Council
of Canada

J. Arghavani

*Ph.D. (École
Polytechnique)*
Aero Precision

S. Engin

Ph.D (Istanbul Technical U)
Pratt & Whitney Canada

E. Esmailzadeh

*Ph.D. (University of
London, U.K.)*
Institute of Technology,
University of Ontario

M. Hojjati

Ph.D. (Concordia U.)
National Research Council
of Canada

A. Kaushal

Ph.D. (Concordia)
Rolls Royce Canada

M.B. Khalil

Ph.D. (Concordia)
Milwaukee School of
Engineering, USA

P. Marcotte

*Ph.D. (Virginia Polytech
University)*
Institut de recherche en
Santé et en Sécurité du
Travail du Québec

A.C.K. Ng**D. Nikanpour**

*Ph.D. (Cranfield
University, U.K.)*
Canadian Space Agency

Y. Ono

Ph.D. (Tohoku Univ.)
National Research Council
of Canada

C. Rabbath

Ph.D. (McGill U.)
Defense Research and
Development Canada

Y. Soucy

*Ph.D. (Carleton
University, Ottawa)*
Canadian Space Agency

AFFILIATED ASSOCIATE PROFESSOR

Yong Zeng

Theory of Design

PART-TIME FACULTY

S. Engin**P. Gauthier****A. Hemami****A. Kaushal****M. Khalil****V. Kozel****H. Moustapha****T. Obuchowicz****C. Rajalingham****A. Segall****S. Sharifi****M.-H. Ton-That****X. Yi**

VISITING SCIENTISTS

H. Azzam

Egypt
Feb. 1, 2005 – Aug. 2005
(with Dr. S.V. Hoa)

T. Chai

Apr. 10 – Oct. 9, 2006
(with Dr. Su)

S. Yoh (Z.J. Yang)

(with Dr. Su)

G. Zhang

Apr. 7 – Sep. 2006
(with Dr. Su)

VISITING RESEARCHERS

A. Herran-Gonzalez

Jan. 1 – July 31, 2006
(with Dr. M. Chen)

L. Ionescu-Vasii

Feb. 1, 2004 – Feb. 1, 2006
(with Dr. Wood-Adams)

A. Natani

(with Dr. Bhat)

POST DOCTORAL FELLOWS

F. Defersha

May 1, 2006 – Apr. 30, 2007
(with Dr. M. Chen)

S. Ibrir

Feb. 1 – Aug 2006
(with Dr. Xie)

S.I. Kim

Aug. 1, 2006 – Jul. 31, 2007
(with Dr. Hassan)

X. Li

(with Dr. Packirisamy)

T.T. Mengistu

June 1, 2005 – Dec. 31, 2006
(with Dr. Ghaly)

Mehrzaad Namvar

Jul. 2004 – Apr. 2006
(with Dr. Su)

Temesgen Mengistu

May 1, 2005 – to date
(with Drs. Ghaly and Haghighat)

I. Salim

Querétaro State University
Aug. 1, 2004 – Aug. 1, 2006
(with Drs. Su and Xie)

Md. H. Sattari

Laval University
June 1, 2005 – May 31, 2006
(with Drs. Sedaghati and Ganesan)

D. Xu

Concordia University
June 2005 – to date
(with Dr. Hoa)

Q. Zhao

Concordia University
June 2005 – to date
(with Dr. Hoa)

RESEARCH ASSOCIATES

A. Allaoui

Jan. 30, 2006 – Jan. 29, 2007
(with Drs. Hoa and Pugh)

J. Amritsar-Singh

(with Dr. Packirisamy)

S. Andronenko

Sep. 20, 2004 – date
(with Drs. Stiharu and Packirisamy)

W. Basha

Apr. 15 – July 15, 2006
(with Dr. Paraschivoiu)

S.S. Busuioc

S. Chadha

May – July 2006
(with Dr. Packirisamy)

G.Y. Chen

Jul. 1, 2004 – Jul. 1, 2005
(with Dr. Xie)

Jian Chen

May 2004 – April 2007
(with Dr. Hong)

H. El-Sadi

(with Dr. Esmail)

A. Fatseyeu

(with Dr. Wood-Adams)

D.G. He

X. Jia

Md. Kaveh

(with Dr. Paraschivoiu)

X. Li

Ph.D. (Concordia)
Mar. 15, 2004–Apr. 14, 2005
(with Drs. Stiharu and Packirisamy)

K. Mourtazov

Apr. 2006 – June 30, 2006
(with Dr. Hoa)

M. Mourtazov

June 30, 2006 – to date
(with Dr. Hoa)

M. Namvar

(with Dr. Su)

P. Ouellette

M.A.Sc. (Concordia)
Composites Lab
1979-to date
(with Dr. Hoa)

A. Parvez

Ph.D. (Concordia)
Mar. 2005 – Mar. 2006
Composites Lab
(with Drs. Hoa & Medraj)

G. Rinaldi

Ph.D. (Concordia)
Jun. 1, 2006 – May 31, 2007
(with Dr. Packirisamy)

F. Rum

(with Dr. Gordon)

Y. Saed-Aldien

Ph.D. (Concordia)
Nov. 2005 – Aug. 2006
(with Dr. Rakheja)

Md. H. Salek

(with Dr. Hoa)

H. Wang

Mar. 2005 – to date
Composites Lab
(with Drs. Hoa and Wood-Adams)

Z. Wang

Mechanical Vibrations Lab
Jan. 5, 2006 – Dec. 31, 2006
(with Dr. Rakheja)

L. Wu

Mechanical Vibrations Lab
June 2005 – to date
(with Dr. Hoa)

M. Xie

June 2005 – to date
Composites Lab
(with Dr. Hoa)

RESEARCH ASSISTANTS

S. Akhlaque**A. Bonakdar**

(with Dr. Dargahi)

S.M.S.C. Bourgeois

(with Dr. Paraschivoiu)

F. Islam

Sep. 15, 2004 – to date
(with Dr. Medraj)

K. Mourtazov

Mar. 2005 – Mar. 2006
(with Dr. Hoa)

M. Mourtazov

Oct. 2005 – June 30, 2006
(with Dr. Hoa)

C. Niewiadomski

(with Dr. Paraschivoiu)

P. Raeiszadeh**T. Rahimzadeh**

(with Dr. Hoa)

Md. Tazi

(with Drs. Packirisamy and Stiharu)

TEACHING FELLOWS

M. Aljarrah

Sep. 6 to Dec. 5, 2005
(with Dr. Medraj)

M.C. Al-Souk

Sep. 6 – Dec. 5, 2005 &
Jan. 4 – Apr. 11, 2006
(with Dr. Bhat)

Q. Fu

Sep. 6 – Dec. 5, 2005 &
Jan. 4 – Apr. 11, 2006
(with Dr. Z.C. Chen)

S. Ghomeshi

Sep. 6 – Dec. 5, 2005 &
Jan. 4 – Apr. 11, 2006
(with Dr. Paraschivoiu)

P. Khosravi-Sichani

Jan. 4 – Apr. 11, 2006
(with Dr. Sedaghati)

R. Motamedi

Sep. 6 – Dec. 5, 2005 &
Jan. 4 – Apr. 11, 2006
(with Dr. Wood-Adams)

R. Muwanga

Sep. 6 – Dec. 5, 2005
(with Dr. Hassan)

M. Nabavi

Sep. 6 – Dec. 5, 2005
(with Dr. Xie)

T.D. Ngo

Jan. 4 – Apr. 11, 2006
(with Dr. Hoa)

R. Pedrami

Sep. 6 – Dec. 5, 2005 &
Jan. 4 – Apr. 11, 2006
(with Dr. Gordon)

A. Pranesh

Sep. 6 – Dec. 5, 2005 &
Jan. 4 – Apr. 11, 2006
(with Dr. Rakheja)

N. Samadi

Jan. 4 – Apr. 11, 2006
(with Dr. Dolatabadi)

N. Shaikh

Sep. 6 – Dec. 5, 2005 &
Jan. 4 – Apr. 11, 2006
(with Dr. Siddiqui)

O. Smadi

Jan. 4 – Apr. 11, 2006
(with Dr. Packirisamy)

S. Sokhanvar

Sep. 6 to Dec. 5, 2005 &
Jan. 4 to Apr. 11, 2006
(with Dr. Dargahi)

F. Tarasi

Sep. 6 – Dec. 5, 2005
(with Dr. Dolatabadi) &
Jan. 4 – Apr. 11, 2006
(with Dr. Medraj)

J. You

Sep. 6 to Dec. 5, 2005
(with Dr. Packirisamy)

A. Zabihollah

Sep. 6 to Dec. 5, 2005
(with Dr. Sedaghati)

SUMMER INTERN / EXCHANGE STUDENT

A. Soni

May – Aug. 2005
(with Dr. Packirisamy)

FULL-TIME LAB INSTRUCTORS

P. Tzenov

P. Sakaris
(until Feb. 28, 2006)

T. Wen
(until Feb. 28, 2006)

TECHNICAL SUPPORT STAFF

J. Alfara
Machinist

W. Chicoine
Machinist

B. Cooper
(until Feb. 28, 2006)
Machine Shop Supervisor

J. Esteves
Technician

G. Huard
Technician

D. Juras
Technical Officer, and
Manager, Technical
Support Staff

B. Luckhart
Technician

A. MacPherson
Machinist

R. Oliver
Technician

P. Tzenov
Senior Design Engineer

ADMINISTRATIVE STAFF

L. Hosein
Assistant, Aerospace
Program, and Coop
Program Assistant

T. Lomma
(started Jan. 2006)
Department Administrator

S. Mérineau
Assistant to Chair,
and Support for Concordia
Centre for Composites
(CONCOM)

S. Poirier
Assistant, Undergraduate,
Office Assistant, and
Webmaster

M. Thuringer
(on maternity leave since
Oct. 2005)
Department Administrator

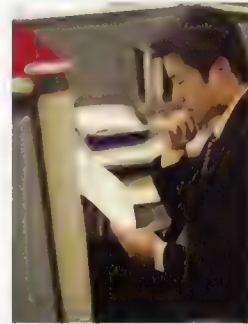
C. Wald
Assistant, Graduate
Program

A. Zimmerman
Office Assistant

AFFILIATED STAFF

J. Claassen
Assistant to Director,
CIADI

J. Hulet (AITS)
W. Pu (AITS)
W. Wong (AITS)



REPORTS FROM SUPPORT STAFF

TECHNICAL STAFF

By Mr. Dan Juras, Technical Officer, and Manager, Technical Support Staff

The major responsibility of the MIE Technical Staff is to supply technical support for the teaching mission in maintaining the teaching laboratories, and to help support faculty members in assisting their students.

At the start of each term the staff ensures that undergraduate lab equipment is set up as required and is operating correctly. In some of these labs the technician operates the complex lab equipment to ensure the correct use and the safety of the students. At the end of term, equipment is serviced and stored until next year. The staff may also give instruction on the operation and use of certain research lab equipment. They perform maintenance and repair of undergraduate equipment. They also may assist faculty and students with the design, manufacture, assembly and testing of projects.

Each of the staff members has a wide variety of overlapping expertise in all areas of mechanical technology, instrumentation, measurement, electronics, computers, design, manufacturing and testing. All of these skills are required along with the knowledge of health and safety rules and regulations to ensure the safe day-to-day operation of the MIE labs.

Currently we are in the process of renovating our undergraduate laboratories, efficiently consolidating our operation so as to provide better service to all.

Our technical staff really enjoy helping everyone in realizing their projects and have a wealth of practical design experience to share. The MIE staff of seven is: Juan Alfara, machinist; William Chicoine, machinist; Jose Esteves, technician; Gilles Huard, electronics technician; Brad Luckhart, technician; Alex Macpherson, machinist; and Robert Oliver, technician.

Design and Manufacturing Laboratory (machine shop)

Once again this year the Design and Manufacturing Laboratory was very busy with both graduate and undergraduate instruction and student projects. Servicing the entire Engineering Faculty allows us to be involved with many interesting and diverse projects. It is always very rewarding to help our students achieve their success. We are now giving more hands-on and much needed exposure time to the students by reconfiguring the original labs to machining labs, lasting from 4 hours to 18 hours.

Services available are CNC machining, conventional machining, design consultation, machine instruction and supervision.

In order to promote better hands-on training and practical experience, we will be introducing a machining instructional course for graduate students and staff who wish to use the student machine shop area to work on their projects. This basic course will give instruction on safety and the basic use of machine shop tools such as the milling machine, lathe, drill press, and band saw; this will be prerequisite to the free use of the student shop area. The student shop will be available Monday through Friday through the winter, Mondays and Tuesdays thru the spring and summer. We are sure the students will reap the benefits from this practical experience.

Last but not least is our continued support for student associations and their activities such as SAE competitions, Robo wars and CSME events.

WHAT'S NEW IN UNDERGRADUATE TEACHING LABORATORIES

By Dr. Petre Tzenov, Senior Design Engineer

The establishment of our undergraduate laboratories contributes substantially to the departmental teaching activities. The laboratories form an important structure in the department that helps consolidate students' theoretical knowledge and builds practical skills.

As of April 2005, we had almost 40 labs that correspond to undergraduate courses taught. There are normally five experiments in each lab to be performed by the students during one semester. Hence, our undergraduate students are exposed to about 200 experiments that cover important phenomena in the field of mechanical and industrial engineering.

To determine and update the topics of these experiments and to create the corresponding workstations is a challenging job, carried out mainly by the professional support staff and the technicians. Some of the topics are continuation of research activities, and others are experiments suggested by other educational institutions and industries in our geographical area. Suggestions from the faculty members teaching the course, feasibility analyses done by staff and graduate students, etc. are also important contributions. In general, the topics and the work stations in the undergraduate labs are long term assets of the department.

As several faculty members may teach the same course, procedure is needed to upgrade the labs associated with these courses in order to allow everybody to contribute to the lab. Pooling of ideas provides productive investment of energy and funds for the lab workstations.

Two years ago a very successful influx of funds made possible acquisition of modern, up-to-date industrial and educational equipment like two CNC machines, a flexible manufacturing cell, vehicle lab equipment, a gas-turbine, etc. Now the goal is to analyze in detail the functioning of the systems bought and to modify and develop experiments to fit our objectives and needs.

Improvement of the lab training of the students has been achieved. In addition to the existing manuals, a system of posters was introduced to speed up the understanding and improve the visualization of the teaching in the lab; we have prepared almost 100 posters in the labs.

Teaching Assistantship

The institution of teaching assistants is another important structure in the department. TAs have close contact with the undergraduate students via tutorials, lab demonstrations and markings. Efficient TA performance attracts students' attention, inspires students and enhances their natural curiosity.

AIMS (THE IT GROUP)

By Joe Hulet, an IT professional in AITS

A major change was implemented last year, with regards to IT support. The ENCS faculty decided to centralize the IT staff from all the ENCS departments into a new Academic Information Technology Support (AITS) unit. This unit is composed of groups based on various areas of IT specialization, instead of by department. It includes the networking academic group (NAG), office support group (OSG), server academic group (SAG), desktop group (DOG), helpdesk and hardware support. With approximately 40 IT professional staff, this structure provides a larger base of support for the MIE department's ever growing computer needs.

As a result of the ENCS IT consolidation, the MIE department's IT services have been transferred to the AITS group. This includes mail services, web services, software licensing, computer hardware/software acquisition, installation, maintenance, networking and security including user authentication. All these services, which are critical for the smooth operation of our department, are now centralized.

Assistance with computer problems has been migrated to the ENCS helpdesk. They will assist all the department's computer users which includes faculty, staff, undergraduate and graduate students. Whether a department user is facing Window's BSOD (blue screen of death) or just requires a hardware/software upgrade, the AITS team will be there to provide assistance on a personal basis. Issues specific to MIE, such as specialized software support for MIE software, are still being handled by the former MIE IT team. The move of the various MIE annexes to the new ENCS building has also further standardized the high level of computer support.

PHOTO OF FACULTY AND STAFF MAY 2005



Faculty & Staff, May 2005: Hall building, right before moving into the new EV building

DEPARTMENT EVENTS**RESEARCH DAYS****2005-2006****RESEARCH DAYS**

By Ms. Sophie Mérineau, Event Organizer

Introduction of the Research Days

This past year the Department of Mechanical and Industrial Engineering organized for the second time a series of seminars on the research activities of our faculty members with the addition of a graduate student presentation competition this year. The organizers of the *RESEARCH DAYS* for the year 2005-06 were Dr. Paula Wood-Adams and Dr. Javad Dargahi with the assistance of Sophie Mérineau.

Purpose

The purpose of the Research Days was to provide an opportunity for members (faculty, staff and students) of the Department to have some idea about the research activities carried out in the Department, to enhance collaboration between researchers, and also to instill interest in students to take up research projects with professors in the Department.

The graduate student presentation competition was an opportunity for the students to learn about their presentation skills and good graduate research work. The students were judged on their skills of presentation and their ability to educate the audience clearly and to the point. They were evaluated on the following criteria: Clarity, Organization, Visual materials, Answers to questions, Significance of the work and Time limit consideration. The members of the Judging Committee were: Ali Akgunduz, Javad Dargahi, Ali Dolatabadi, Luis Rodrigues, Kamran Siddiqui, Paula Wood-Adams, Wenfang Xie and Mamoun Medraj.

The Research Days were held before the Department Council Meeting each month starting in October 2005 until March 2006, except in December. The presentations in October and November were given by the new faculty members and those who did not present last year.

Acknowledgements

Special thanks to Dr. Suong V. Hoa and the organizers, Dr. Paula Wood-Adams and Dr. Javad Dargahi for this successful initiative. Sophie Mérineau and Robert Oliver also contributed to the organization of the Research Days.

The Research Days presentations were held on the following dates

<u>PRESENTED BY</u>	<u>TYPE OF SEMINAR</u>	<u>POSITION / DEPT. / INSTITUTION</u>	<u>TOPIC OF PRESENTATION</u>	<u>DATE</u>
Prof. Mehran Mehregany	Research Days Seminar	Department of Electrical Engineering and Computer Science Case Western Reserve University	Silicon Carbide Micro/Nano Systems for Harsh Environment and Demanding Applications	Sept. 23, 2005
Vincent Hayward	Research Days Seminar	Centre for Intelligent Machines, McGill University	The Perception of Haptic Shape at Different Scales	Oct. 14, 2005
Prof. A. Shirazi-Adl	Research Days Seminar	École Polytechnique	Biomechanics of Human Spine: How to Reduce Risk of Injuries	Nov. 11, 2005
Prof. Christian Moreau	Research Days Seminar	Group Leader Surface Technologies National Research Council Canada Industrial Research Materials Institute, Boucherville, Quebec	Advanced Optical Diagnostics in Thermal Spray Processes	Dec. 2, 2005
A. Bonakdar	Research Days Seminar – Graduate Student Presentation Competition	Graduate Student Department of Mechanical and Industrial Engineering Concordia University	Grasping Contact Analysis of Biological Materials with Applications in Minimally Invasive Surgery	Jan. 20, 2006
S. Shehab	Research Days Seminar – Graduate Student Presentation Competition	Graduate Student Department of Mechanical and Industrial Engineering Concordia University	A Mixed Piecewise-affine (PWA) and Backstepping Strategy to the Problem of Path Following for Micro Air Vehicles (MAV)	Jan. 20, 2006

M. Arafin	Research Days Seminar – Graduate Student Presentation Competition	Graduate Student Department of Mechanical and Industrial Engineering Concordia U.	Transient Liquid Phase Bonding of Nickel Superalloys and Stainless Steels with BNi-2	Jan. 20, 2006
M. Nabavi	Research Days Seminar – Graduate Student Presentation Competition	Graduate Student Department of Mechanical and Industrial Engineering Concordia U.	Design and Analysis of Piezoelectric/Acoustic Pump for Biomedical Application	Mar. 3, 2006
Y. Zhu	Research Days Seminar – Graduate Student Presentation Competition	Graduate Student Department of Mechanical and Industrial Engineering Concordia U.	?	Mar. 3, 2006
Y. Yuryev	Research Days Seminar	Graduate Student Department of Mechanical and Industrial Engineering Concordia U.	Application of Atomic Force Microscopy for the study of Crystallization Kinetics and Morphology of L- and D-Polylactide Blends in Solution Cast Thin Films	Mar. 3, 2006
A. Zabihollah	Research Days Seminar – Graduate Student Presentation Competition	Graduate Student Department of Mechanical and Industrial Engineering Concordia U.	Vibration Suppression and Design Optimization of Smart Laminated Structures	Mar. 31, 2006
V. Kocar	Research Days Seminar – Graduate Student Presentation Competition	Graduate Student Department of Mechanical and Industrial Engineering Concordia U.	Modelling Engineering Change Management Process in Virtual Collaborative Design Environment	Mar. 31, 2006
A. Khan	Research Days Seminar – Graduate Student Presentation Competition	Graduate Student Department of Mechanical and Industrial Engineering Concordia U.	A Study of Completed Local Gouging Check in 3-Axis Sculptured Surface Machining	Mar. 31, 2006

SEMINARS AND SYMPOSIA HELD IN THE DEPARTMENT

<u>PRESENTED BY</u>	<u>TYPE OF SEMINAR</u>	<u>POSITION / DEPT. / INSTITUTION</u>	<u>TOPIC OF PRESENTATION</u>	<u>DATE</u>
Dr. Kamran Lari	DMIE seminar (Industrial Engineering)	President, LARINEX International Inc.	Teaching topic: Introduction to Fuzzy Logic & Fuzzy Controllers Research topic: Sparse Data Estimation for Knowledge Processes	Aug. 31, 2005
Dr. Young Keun Choi	DMIE seminar (Industrial Engineering)	Department of Industrial Engineering Texas A&M University, Texas, USA	Teaching topic: Manufacturing Systems Automation Research topic: Tool Path Generation and 3D Tolerance Analysis for Free-Form Surfaces	Oct. 18, 2005
Ebrahim Esmailzadeh, Ph.D., P.Eng., C.Eng.	DMIE seminar – Canada Research Chair	Professor of Mechanical Engineering, Faculty of Engineering and Applied Science University of Ontario Institute of Technology, Oshawa, Ont.	Four-Wheel Independent Drive (4WID) Vehicles: A New Concept for Electric Vehicles	Oct. 26, 2005
H. J. McQueen	The Institution of Mechanical Engineers (I MECH E) – Eastern Canada Branch	Professor Emeritus, Mechanical Engineering, Concordia University	Modern History of Pipe Manufacture and Application	Oct. 30, 2005
Dr. Tolga Bektas	DMIE seminar (Industrial Engineering)	Centre de recherche sur les transports de la Université de Montréal	Teaching Topic: Introduction to Mathematical Modeling: A Powerful Tool in Problem Solving Research Topic: Designing Cost-Effective Content Distribution Networks	Oct. 31, 2005
Prof. Charbel Farhat	DMIE seminar	Department of Mechanical Engineering Department of Aeronautics & Astronautics and Institute for Computational and Mathematical	Dynamic-Data-Driven Computational Decision Support Systems: Opportunities, Enabling Methodologies, and Significance	Nov. 18, 2005

Prof. Atef Fahim	DMIE seminar	Department of Mechanical Engineering University of Ottawa	Capstone Design Project Course	Nov. 22, 2005
Dr. Ahmad Hemami	DMIE seminar	Adjunct Professor, McGill University ; Part-time Professor, Concordia U.	Wind Energy – Clean Energy	Mar. 10, 2006
Dr. Afzal Suleman	DMIE seminar	Professor and Associate Dean Research, Department of Mechanical Engineering University of Victoria	Active Aeroelastic Aircraft Structures – A Smart Structures Approach	Apr. 21, 2006
Dr. Rolf Wüthrich	DMIE seminar (Micro- and Nano-Systems)	Laboratoire de systèmes robotiques École Polytechnique Fédérale de Lausanne, Switzerland	Teaching Topic: Deformation of a Linear Beam Research Topic: Using Electrochemical Discharges for Micro- and Nano-system Fabrication	Apr. 25, 2006
Xiangchun Xuan Ph.D. Candidate	DMIE seminar (Micro- and Nano-Systems)	Department of Mechanical and Industrial Engineering University of Toronto	Teaching Topic: Electroosmotic Flow in Microchannels Research Topic: Electrokinetic Transport Phenomena in Microfluidic Devices	Apr. 26, 2006
Dr. Hoi Dick Ng	DMIE seminar (Energy and Alternative Fuel Systems)	Department of Mechanical and Aerospace Engineering Princeton University USA	Teaching Topic: An Introduction to Alternative Energy Systems: The Need for Alternative Energy Sources Research Topic: Safety Aspects Related to the Future Hydrogen Economy	Apr. 28, 2006
Dr. Archana P. Sangole	DMIE seminar (Bio-mechanical and Bio-engineering)	Rehabilitation Institute of Montreal (CRIR)	Teaching Topic: The Wrist Complex Research Topic: Prehension-related Deficits in Brain Injury	May 2, 2006

Dr. Krishnan Venkatakrishnan	DMIE seminar (Micro- and Nano-Systems)	Department of Mechanical and Industrial Engineering Ryerson University	Teaching Topic: What Information Technology is for Today will be Nanotechnology for the Future Research Topic: Pulsed Laser Micro and Nano Machining for Microelectronic, Photonics and MEMS Applications	May 3, 2006
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ASME-QUEBEC SECTION, POWERED PRINCIPALLY BY M.I.E. PROFS

By Ms. Arlene Zimmerman

The Quebec Section of the American Society of Mechanical Engineers was founded in 1998 and its Executive consists mainly of Concordia Mechanical Engineering professors. During 2005-2006, ASME-Quebec Section hosted several events, some of which were also made open to the membership of SAE and IEEE.



Graduate students meeting in a rest area of the EV building

DESIGN & AWARDS DAY IN THE DEPARTMENT OF MECHANICAL & INDUSTRIAL ENGINEERING

By Ms. Leslie Hosein, Event Organizer; and Dr. Ali Akgunduz, Chair of Design and Awards Day Event

The annual Design and Awards Day was held on April 11, 2006 in the Department of Mechanical and Industrial Engineering. The successful spirit of the department was highlighted during the event. During the ceremony we showed our appreciation for wonderful engineering designs presented by our senior undergraduate students and we thanked our students for representing Concordia University at outside events and at various student competitions. We also thanked them for being active in their student associations. The recipients of Silas Katz Memorial Scholarship showed one more time that academic excellence comes at all ages. This year, for the first time we organized a Graduate Student Presentation Competition and the winners of the competition were recognized during this event. Our students also showed their appreciation to various faculty members for their teaching. The hard work of our technical and support staff were recognized during the event. In the Excellence in Research competition, several young faculty members demonstrated the strength of their research programs. Dr. Ali Akgunduz presided over the event.

The Design and Awards day was a special occasion where our graduate and undergraduate students, faculty members and support staffs had the opportunity to socialize and appreciate each other. Finally, it is important to recognize the hard work of Leslie Hosein who made this event successful.

Associate Dean Rama Bhat presented the Certificate of Recognition for Excellence in Service to the Department, to the following faculty and staff members: Dr. Ali Dolatabadi – Faculty (Teaching); Dr. Ibrahim Galal Hassan and Dr. Muthukumaran Packirisamy – Faculty (Research); Leslie Hosein and Sophie Merineau – Administrative Support Staff; Dainius Juras – Technical Support and Machine Shop Staff.

Dr. S.V. Hoa, Chair of the department, presented Certificates of Appreciation of Service to the Department to faculty members: Dr. A.K.W. Ahmed for 20 years of service; Dr. R. Ganesan for 10 years of service; Dr. Gerard Gouw for 20 years of service; and Dr. I. Stiharu for 10 years of service. Staff members were also presented with Certificates of Appreciation: Gilles Huard for 15 years of service; and Sophie Merineau and Charlene Wald each for 10 years of service.

Dr. Ali Akgunduz was presented the Canadian Society of Industrial Engineering Award for Teaching Excellence by Alexander Sinoyannis, President of CSIE's Concordia chapter.

Dr. Ali Dolatabadi was presented the Canadian Society for Mechanical Engineers Award for Teaching Excellence by Pierre Carpentier, President of CSME's Concordia chapter, on behalf of all students in the chapter.

The Silas Katz Memorial Scholarships for mature undergraduate students studying full-time, having a GPA of above 3.5 and having completed between 30 and 90 credits went to Hai Qing Liang and Li Sheng Tu.

The awards for the Capstone Design competition were also handed out. The Richard Cheng Design Award for Mechanical Engineering was won by Benjamin Andrew Preece, Fedwa Chraibi, Kaakhuong Mo, Firas Ali and Yi Ran Feng for their project entitled “Pet Door”. The Mechanical and Industrial Engineering Capstone Design Award was won by Reda Kafal Ramez, Sherif Kamal, Steven Michael Santangelo and Karl Alaimo for their project entitled “Ply Picker”. Capstone Design Award Certificates of Merit were presented to two Capstone teams from Mechanical Engineering: the first to Erin Curry, Jacob Karelus-Grzywacz, Yasar Khan, Dany Khawam, Carlo Nicola Pagano and Robert Swinton, for the project entitled “Wind Turbine”; and the second was presented to Tanya Michelle Potoreyko, Alexandra Pollifrone, Francis Belanger and Davide Prella for the project entitled “MAV – Micro Air Vehicle”. A Capstone Design Award Certificate of Merit for Industrial Engineering was presented to Abdulmenhem El-Refaai, Eric Barile, Dana Dababneh, Rae Anani and Nadi Parissi for their project entitled “Service Facility Preparation for Aircraft Engines”.

An undergraduate student was also presented with a Certificate of Merit for his involvement in extracurricular activities in student associations: Ahmed Hassanein for CSIE.

This year for the first time an award was presented to graduate students who participated in the Graduate Student Presentation Competition Awards. Graduate students gave presentations as part of the department’s Research Days. The committee to select the winners of these awards was so impressed with the students’ performances that there was a tie for second and third place. First place went to Muhammad Arafin, second place was shared by Yury Yuryev and Shahid Hameed Khan.



CAPSTONE DESIGN PROJECT –
helicopters



CAPSTONE DESIGN PROJECT -
competition and display

ENCS students shine in the CSME 2006 Student Design Competition

Taken from the ENCS website, June 2006

The CSME 2006 Student Design competition was held concurrently with the biannual CSME Forum 2006 in Calgary, Alberta. Davide Prella and Alessandra Pollifrone from the department of Mechanical & Industrial Engineering at Concordia University received the first prize for successfully designing, building, and flight testing the first fixed-wing Canadian Micro Air Vehicle (MAV). Congratulations to Davide & Alessandra!

CAPSTONE DESIGN PROJECT

CAPSTONE DESIGN PROJECTS AT THE DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING AT CONCORDIA UNIVERSITY

Hoa, S.V., Hong, H., Bhuiyan, N., Siddiqui, K. and Pugh, M.

*Department of Mechanical Engineering, Concordia University
Montreal, Quebec, Canada H3G 1M8*

Abstract:

A new approach to conduct the capstone design project at the Department of Mechanical and Industrial Engineering at Concordia University has produced significant improved results as compared to previously. This paper describes the new approach and the results.

How the capstone design project was done before:

Since 2000, the capstone design project has become mandatory for all undergraduate students in the Mechanical Engineering (ME) program and in Industrial Engineering (IE) program. This is a full year (two semesters of Fall and Winter) project. There are about 100 students registered in the ME program and about 20 in the IE program. Students are supposed to carry out an open ended design project that encompasses different elements of science and engineering that they have learned in the previous three years. Apart from the open ended nature of the projects, students should work in team. The project entails presentations at different check points of the course so that students would be also required to learn the presentation.

For each year from 2000 till 2004, when the students attended their first lecture of the course in September, they are told that they have to find projects to work on. Teams are also formed at that time. Teams were usually formed based on the willingness of the students to work together. The Department has machine shop facilities which would help the students in fabricating the designs into pieces of hardware. Students are also required to test the pieces of hardware to validate the designs.

Usually about 20% of the Mechanical Engineering students have projects well defined within the first two months from the beginning of the course. These students are fairly handy. They are usually involved in practical projects such as those of the Society of Automotive Engineers (SAE). The other 80% of the students usually have difficulty finding good projects. Everybody eventually finds some project to work on. However most of the time, there are various problems as follows:

- Projects are paper projects (projects that could not be finished in time so that machining can be done to produce hardware).
- Projects that are unrealistically difficult such that they can not be finished by the end of the course. If a project is so difficult such that it can not be finished at the end of the course, it is difficult to fail the students since the project was approved by the course coordinator in the early part of the course.
- Projects with industry that depend on the industrial company to provide facilities for testing. Companies usually are busy with their production schedule and may not give priority to the student projects. These then tend to be not finished by the end of the course. Sometimes extensions were requested and this caused problems.
- Sometimes students choose SAE projects as capstone design projects. SAE projects are excellent for the practical education of the students since they provide practical hardware to work on. They provide team work and they provide pressure due to

competition. However more often than not, SAE projects involve the refining of a particular part of the vehicle for the sake of competition and the open-ended element may not be sufficient. Also the deadline for competition is usually in May, which is about one month after the end of the course. Students invariably ask for extension for the submission of the project so that the end of the project for the course coincides with the deadline of the competition. If the school places a lot of significance into helping the students to win the competition to get publicity, then the deadline of the course may be relaxed to accommodate the students' schedule. This may not be fair to the rest of the students and in some way, the academic activity is taken hostage by an external body.

- In terms of budget, some student projects require a lot of money and some may not require much money, depending on how much the project is being worked out. This again does not reflect well on the planning for the conduct of the course.

Definitely the above shortcomings need to be fixed if one were to provide the students with good exposure to design in the form of a capstone design project. In addition, if students do not have good projects to work on, they miss an opportunity for their training; at the same time, there is a waste of excellent human power resources since the students have inquiring minds which may provide innovative solutions for well defined problems.

A new approach:

In order to address the above shortcomings, the design committee at the MIE department at Concordia University gave a lot of thinking to find a new approach. One best way would be to obtain projects from industry. This requires significant efforts on the part of the course coordinator to contact industry for projects. This should be done on a continuous basis. However, there is no guarantee that sufficient number of good projects can be found. Some controlled way needs to be found to provide the supplement to the good industrial projects or good projects proposed by the students.

The capstone design team at MIE Concordia decided to select a certain product for students to work on. The job of the students would be to modify and improve on the proposed product. The product should be readily available to the students so that they have ample opportunities to study the existing design. There should also be sufficient space for the projects.

For the academic year 2004-2005, the capstone design committee decided to select two products: the commercially available scooters and a small water turbine that may be powered using the current in the river (for potential use by the population in developing countries). The cost of the scooters is not too excessive for the budget of the department in the acquisition of a few units. They also do not require a large amount of space. The water turbine was the result of an idea from a previous year's project. Once the product was selected, it was broken down into different components so that different groups could work on it. The different components are as follows:

- The engine: The gas engine should be changed to an electric engine. This project can be addressed by students in the Thermo-Fluid option group.
- The frame: The metal frame should be changed into a lighter weight frame. This project can be addressed by the students in the Design and Manufacturing group.
- The control mechanism: This can be addressed by students in the Control and Automation option group.
- The water turbine was done by two different groups but these two groups are working on similar projects since this project can not be broken down into sub projects.
- The industrial engineering students also took up the scooter project but they study different aspects of industrial engineering such as Market study for the scooter, the

Manufacturing procedure, Social aspects of the scooters, and Safety consideration for the scooter.

In addition to the projects defined above, students could also propose their own projects for consideration by the capstone design committee. To be acceptable, a project has to satisfy at the outset the following 4 criteria:

- The project has to be open ended.
- There should be sufficient resources at the Department to support the project. This includes machining resources, testing facilities, computer facilities, etc. If a project requires special equipment for testing or special facilities that the department does not have at the outset, students must demonstrate that they can secure the resources and have sufficient access to assure successful completion of the project.
- The project should be able to be finished within the time frame of the course, i.e., from September to the end of March.
- Each project is allowed a budget of \$500 for the purchase of materials and supplies. If students require more than this amount, they must demonstrate that additional funding can be solicited by themselves to assure successful completion of the project within the time frame of the course.

Time frame:

The capstone design committee began working on the definition of the supplementary projects in May 2004. They defined the subprojects in the scooter, analyzing to make sure that the projects can be finished within the time frame of the course. If there were equipment necessary then these were acquired in the summer before the course began. Scooters were acquired to be placed in the capstone design room. Necessary tools were also purchased.

(More details can be found in “Capstone Design Projects at the Department of Mechanical and Industrial Engineering at Concordia University”, by Hong, H., Hoa, S.V., Bhuiyan, N., Siddiqui, K. and Pugh, M., *Proceedings of the Canadian Design Engineering Network (CPEN) Conference*, Calgary, July 2005.)



The student machine shop - the lathe

UNDERGRADUATE PROGRAM

By Dr. Pugh, Undergraduate Program Director

The undergraduate programs are both doing well. Major changes to the undergraduate program were implemented starting September 2005 to improve the programs in general and to increase the number of elective courses in the Industrial program and also in the four different options of the Mechanical Engineering program: Thermo-fluid & Propulsion, Design & Manufacturing, Mechatronics & Control Systems and Aerospace & Vehicle Systems.

Over the past few years more emphasis has been placed on the design aspect of engineering. To this effect, the mechanical and industrial engineering capstone design projects are now compulsory for all students. These projects allow students to be creative and to build prototypes of their designs. This year, projects were displayed at a poster session open to the whole university and the public. This display gave students, staff and faculty a good opportunity to see the different projects and it may also have given ideas to the 1st, 2nd and 3rd year students. The top projects were displayed in the department of Mechanical and Industrial Engineering during the Design & Awards Day. Also by giving awards (certificates and cash) to the best groups, the department motivates the students to produce the best project.

CO-OP PROGRAM

By Dr. Sedaghati, Co-op Program Director

The Co-op program bridges the gap between the academia and industry with emphasis on the relationship between the university, student and employer. The program is offered in the department of mechanical and industrial engineering in parallel with the regular program. Co-op is an integrated approach, which enables bright, highly motivated students to alternate academic terms on campus with relevant, paid, full time work experience. In other words, students either study full-time or work full-time in industrial or governmental sectors on a co-op work term related to their studies. Thus, the practical experience gained on these structured and supervised work terms is an integral part of the student's education in the Co-op program. The regular program is an eight-term four-year program where students study every fall and winter. Co-op format also takes four years and students take the same courses as the regular program. The new format of Mechanical and Industrial co-op programs consists of eight study terms and three work terms. Students should have their first, second and third work terms in the fall of second year, and winter and summer of third year, respectively. In order to continue their studies or graduate from the department of mechanical and industrial engineering, co-op students must maintain cumulative Grade Point Average of at least 2.70 with no single term below 2.50, be assigned a grade of pass or pass with distinction for each of the three work term courses by both employer and academic director (the evaluation of the work terms is based on the employer's assessment, a work site visit and the student's work term report) and remain on their designated work-study sequence.



Lobby of Hall building (undergraduate classes)

GRADUATE PROGRAM

By Dr. Hassan, Graduate Program Director, and Charlene Wald, Graduate Program Assistant

The Department of Mechanical and Industrial Engineering offers the degrees of Doctor of Philosophy in Mechanical Engineering, Master of Engineering in Mechanical Engineering, Master of Applied Science in Mechanical Engineering, Master of Engineering in Aerospace, and Graduate Certificate in Mechanical Engineering. The Master of Engineering in Industrial Engineering and the Master of Applied Science in Industrial Engineering are two new programs that will be implemented in the 2006 -2007 academic year.

The Master of Engineering Program has undergone curriculum changes. Students may specialize in one of the following branches:

- Industrial Control Systems
- Materials and Composites
- Mechanical Systems
- Thermofluids

Ph.D. Comprehensive Examinations were held on scheduled dates – three times a year. Efforts were made to generalize the written exam of the same subject for all students. Attention was paid to ensure that students were on-track in their Ph.D. studies.

The number of students who have graduated in the Fall 2005 and Spring 2006 convocation were: 60 students in the Master of/Magisteriate in Engineering (Mechanical Engineering), 45 students in the Master of/Magisteriate in Applied Science (Mechanical Engineering), and 8 students in the Doctor of/Doctorate in Philosophy (Mechanical Engineering) programs.

It is with much pleasure that we announce that the following students received the following awards in 2005-2006: NSERC CGSM award: T. Ahmad; Carolyn and Richard Renaud Teaching Assistantships: M. Arafin, N. Tajallipour; School of Graduate Studies Doctoral Teaching Assistantships: R. Muwanga, S. Sokhanvar; Campaign for Concordia Graduate Awards: H.A. Izadi; Hydro Québec Graduate Award: S. Sokhanvar; Graduate Fellowship: B.J. Derisi, H. Babaei, H. Izadi; Concordia University International Fee Remission Awards: A.L. Amalorpavasamy, M. Arafin, A. Azimi, H. Babaei, Md M. Islam, H. Izadi, R. Khaksarfard, and R. Pedrami.

Dr. Hassan has completed his term as Graduate Program Director on May 31st, 2006. Dr. Wood-Adams and Dr. Medraj will be responsible for the Graduate Programs for the next two years. Dr. Wood-Adams will be the Ph.D. Graduate Program Director and Dr. Medraj will be the Program Director for the M.A.Sc. and M.Eng. programs.

In sum, the Graduate Program has made many improvements in the last year and we anticipate more to come.

MASTER OF ENGINEERING – AEROSPACE PROGRAM

By Dr. Paraschivoiu, Aerospace Program Director

The significant growth of the aerospace industry in Quebec has resulted in a demand for the establishment of graduate level specialization in the field of aerospace technology. In the early 1990's strong representations were made on behalf of the aerospace industry to the Quebec universities to develop and to set up a new Master's program which should be available at all major Quebec universities. A consortium of several universities and aerospace companies was formed to develop a cooperative Master's degree program in aerospace engineering to meet the growing demands of the industry for highly qualified aerospace engineers in the different areas of specialization.

This unique Master of Engineering program is available at Concordia University in association with five other Quebec universities and with the Quebec Aerospace Industry. The admission requirements and academic performance standards are governed by regulations of the university. Minimum requirement for graduation is 45 credits and includes core and specialization courses in the areas of Aeronautics and Propulsion, Avionics and Control, Structures and Materials, and Space Engineering. The number of students admitted to the program is limited and is based upon their academic excellence and their expressed interest in the aerospace field. This academic year 2005-2006, 20 students graduated from this program.

Cooperating Universities:

Concordia University
École Polytechnique
Ecole Technologie Supérieure
McGill University
Université Laval
Université de Sherbrooke

Aerospace Industry Partners:

Bell Helicopter Textron
Bombardier Aerospace
CAE Inc.
Canadian Space Agency
CMC Electronics Ltd
EMS Technologies
Heroux Inc.
Honeywell Aerospatiale
Lockheed Martin Canada
Oerlikon Aerospace
Pratt & Whitney Canada Inc.
Rolls Royce Canada Ltd.
Thales Avionics



Design Laboratory of C.I.A.D.I.

CIADI



Dr. Hany Moustapha
Fellow ASME, CASI & CSME Senior Fellow &
Manager Pratt & Whitney Canada Technology Programs
Director, CIADI

Dr. Nadia Bhuiyan
Assistant Professor
Mechanical & Industrial Engineering
Associate Director, CIADI

Jayne Claassen
Assistant to the Director, CIADI

Objectives of the Institute

The objectives of the Concordia Institute of Aerospace Design and Innovation (CIADI) are to promote awareness and provide leading edge know-how among engineering students in aerospace design and innovation, with emphasis on its multi-disciplinary nature and evolving technologies.

CIADI, affiliated with the Faculty of Engineering and Computer Science, provides an excellent training opportunity for students before joining the aerospace industry.

Industry Driven “Project-Based Learning”

In order to enhance and complement the education of undergraduate students, the Institute conducts collaborative industry-driven design and research projects of 500 to 1000 hours per year. The number of students grew from 26 in CIADI's first year (2001) to over 120 in 2006, working on well-defined real industry projects with 21 partners.

The students, selected among the top undergraduate students in the Faculty of Engineering, are supervised by the industry and Concordia professors. Progress meetings are conducted monthly at CIADI to expose the students to all projects. A number of CIADI projects are normally credited by the Faculty as Capstone design projects.

The Institute provides, through some preliminary industry research projects, “an initiation to research” for some students who want to pursue graduate studies in aerospace, as part of the Consortium de recherche et d'innovation en aérospatiale au Québec (CRIAQ).

Industry Multi-Disciplinary Environment

CIADI provides a true aerospace industry multi-disciplinary environment including state-of-the-art interactive computer facilities, industry hardware, posters, videos, promotion material and a library with aviation books and periodicals. CIADI is collaborating with similar institutes at École de Technologie Supérieure, École Polytechnique and Ryerson University. As of 2005, CIADI started international collaboration and a student exchange program with NASA and Europe (Poland, France, Germany, Italy, Brussels, Portugal and Russia).

Aerospace Promotion and Networking

The Institute is an excellent learning opportunity for undergraduate students to get to know the aerospace industry through organized visits and tours to its industrial partners. In order to address the industry needs, focused training is provided through short courses such as aircraft, helicopter and engine design, CATIA, MATLAB, etc. CIADI and the students are actively involved in various aerospace conferences, forums and students' competition.

Advisory Board

The Institute is managed by an Industrial Advisory Board who advises CIADI on all matters, and acts as liaison between the aerospace industry and the Institute. In particular, it ensures that the Institute is properly informed as to the expectations of the aerospace industry, provides the Institute with effective links with industry and government bodies and assists the Institute in attracting speakers and lecturers from among practicing aerospace engineers.

Industrial Partners

- Pratt & Whitney Canada
- Bell Helicopter
- Bombardier Aerospace
- CAE Inc.
- CMC Electronics
- DEMA
- Heroux Devtek
- Mannarino Systems and Software
- MDA
- Rolls-Royce
- Thales
- AIRBUS (France)
- ONERA (France)
- MTU AeroEngine (Germany)
- CIRA/Compania (Italy)
- NASA (U.S.A.)
- Royal Military Academy (Belgium)
- Air Force Academy (Portugal)
- WSK Rzeszów & PW Kalisz (Poland)
- PWRuss (Russia)



External night view of Hall building

FACULTY MEMBERS' ACHIEVEMENTS

Dr. A.K.W. Ahmed is a Member of the Honorary Advisory Board for BUET Journal of Mechanical Engineering in Bangladesh since 1995. Dr. Ahmed served as member of the advising committee for the International Conference on Mechanical Engineering, ICME-2005 in Bangladesh. He served as reviewer for various journals and NSERC grant applications in the field of his expertise.

Dr. A. Akgunduz is a senior Member of the Institute of Industrial Engineers (IIE) and a Member of the Canadian Operation Research Society. He was awarded the IIE Distinguished Professor award by the Concordia Student Chapter.

Dr. R. B. Bhat is a Member of the Governing Board of Concordia University, 2003-2006, and is the Associate Dean, Graduate Programs and Research, Faculty of Engineering and Computer Science, 2004-2006. He has been the President of the Canadian Society for Mechanical Engineering (CSME) from June 2004 to May 2006. He was elected the Fellow of the Engineering Institute of Canada, Fellow of CSME, Fellow of the Institute of Engineers (India) and the

Acoustical Society of India. He was a reviewer for papers in the Journal of Sound and Vibration and the Journal of Vibration and Acoustics, Transactions of the ASME.

Dr. N. Bhuiyan is the Associate Director of the Concordia Institute for Aerospace and Design Innovation (CIADI) from May 2003 until the present, and she is the Concordia University Faculty Advisor for the Quebec Chapter of the Institute of Industrial Engineers (IIE) from 2002 to the present. She served as a reviewer for: the European Journal of Operational Research, European Journal of Innovation Management, NSERC Discovery Grant applications, and grant applications at the Fonds de recherche sur la nature et les technologies. In 2005 she was awarded the Faculty Award for Teaching. In March 2006, she was invited as a delegate at a symposium entitled 'Leaders in Innovation' highlighting Canada's outstanding younger innovators, organized by the Partnership Group for Science and Engineering (PAGSE) of the Academy of Science of the Royal Society of Canada, an association of national

organizations in science and engineering. She is currently collaborating on research projects with CRIAQ, Pratt & Whitney Canada, and Bombardier Aerospace.

Dr. A.A. Bulgak was an invited speaker at the International Conference on the Effects of Globalization on Financial Reporting held in May 2005 in Istanbul, Turkey. Dr. Bulgak was the reviewer for many engineering journals such as International Journal of Production Research, Computers and Operations Research, IEEE Transactions on Automation Science and Engineering, and the West Indian Journal of Engineering. Dr. Bulgak also served as an external reviewer for tenure and promotion of the Department of Industrial Engineering at Northern Illinois University, USA.

Dr. M. Chen has been the Associate Chair of the Department of Mechanical and Industrial Engineering from May 2000 to May 2006. He was a reviewer for papers in International Journal of Production Research, IEEE Transactions on Industrial Electronics, International Journal of Industrial Engineering, Journal of Integrated Manufacturing

Systems, and Annals of Operations Research. He was also a reviewer for NSERC grant applications. He has served as a member on departmental, faculty and university committees. Dr. M. Chen is a member of the Canadian Operational Research Society and a senior member of the Institute for Industrial Engineers.

Dr. Z.C. Chen is a member of the American Society of Mechanical Engineers (ASME) and a senior member of the Society of Manufacturing Engineers (SME). He was a session chair for several international technical conferences in 2005. Dr. Z.C. Chen is a reviewer for several international technical journals such as Computer-Aided Design, Transactions of the North American Manufacturing Research Institute, and the International Journal of Computer Applications in Technology, among others. Dr. Z.C. Chen is working with Pratt & Whitney Canada on two projects.

Dr. J. Dargahi has been the Student Liaison for ASME-Quebec since Sept. 2002. He received IRIS (EOF) grant in 2003 and IRIS-Tgap grant in 2006. He holds an NSERC discovery grant and was also successful in obtaining a \$115,000 NSERC-RTI grant in 2006. He has published 22 refereed journal papers in

the past four years. Dr. Dargahi has collaboration and contract with Canadian Space Agency and Thought Technology Ltd in Montreal. He was a reviewer for papers in several journals including the Journal of Sound and Vibration and the Journal of Sensors and Actuators. Dr. Dargahi has been organizing research days in the department for the past three years.

Dr. K. Demirli reviewed papers for IEEE Transactions on Fuzzy Systems, IEEE Transactions on Systems, Man and Cybernetics, Fuzzy Sets and Systems, and Robotics and Autonomous Systems. He reviewed research grant applications for NSERC. Dr. Demirli received the 2005 CSIE Teaching Excellence Award. The Capstone Project group he supervised won the best IE Capstone Project Award in 2005.

Dr. A. Dolatabadi is the holder of a US patent (Patent Number 6,845,929). He is the CSME Faculty Advisor at Concordia University. He is a registered professional engineer in the province of Ontario and a member of CSME and ASM. He reviewed articles for the following journals: Journal of Thermal Spray Technology, Canadian Journal of Chemical Engineering, and International Journal of Heat and Mass Transfer.

Also, he is a reviewer for the NSERC Discovery grant, NSERC-I2I, CFI-LOF, Alberta Ingenuity, and Alberta Small Equipment Grants Program (SEGP). Dr. Dolatabadi holds an NSERC Discovery grant, NSERC-RTI, NATEQ operating and equipment grants as well as being a co-investigator on a NATEQ-Team project.

Dr. N. Esmail has been the Dean of the Faculty of Engineering and Computer Science and a Member of the Rector's cabinet, both since June 1997 (and has been renewed until May 2008). He has received the Certificate from the House of Commons of Canada for Outstanding Academic and Professional Achievements. He is a member of the National Council of Deans of Engineering and Applied Science since 1997. He was made a Fellow of the Engineering Institute of Canada in March 2006. He is a Member of the Board of Directors of the International Institute of Telecommunications in Montreal since 1999. He is a Professor Emeritus of the University of Saskatchewan since 1997, and an Adjunct Professor at Ain-Shams University in Cairo since 1997. He is a Fellow of the Chemical Institute of Canada since 1991. He is a member of the Ordre d'ingénieurs du Québec, Canadian Society for Chemical Engineering, Chemical Institute of

Canada, the American Institute of Chemical Engineering, the Technical Association of Pulp and Paper Industry (TAPPI), and the International Advisory Board of the Journal of the Egyptian Mathematical Society. Dr. N. Esmail was inducted to be Fellow of the Canadian Society for Mechanical Engineering in 2005.

Dr. R. Ganesan was appointed for 2001 – 2007 to a Tier-II Concordia Research Chair in the area of Composite Machine Components. He is the Co-Organizer of the Symposium on Joining Technologies for Advanced Materials and Structures at the 2006 ASME International Mechanical Engineering Congress and Exposition to be held November 4 - 10, 2006 in Chicago USA. He was the Session Chair of the International Conference on Resource Utilization and Intelligent Systems (INCRUIS 2006) which was held January 4 - 6, 2006 in Perundurai, Erode, India. He was the Session Development Coordinator and Chair of the Symposium on Joining Technologies for Advanced Materials and Structures at the 2005 ASME International Mechanical Engineering Congress and Exposition which was held in November 2005 in Orlando Florida. He was the reviewer for 10 journals including: International Journal of

Solids and Structures; Science and Engineering of Composite Materials; Journal of Sound and Vibration; Communications in Numerical Methods in Engineering; Journal of Structural Engineering and Mechanics; Mechanisms and Machine Theory; IFToMM International Journal; AIAA Journal, and was reviewer for 3 international conference papers. He was the reviewer for an NSERC-Discovery grant proposal. Dr. Ganesan is a Member of the Analysis and Design Division of the American Society for Composites (ASC), and a Member of the Fastening and Joining Technical Committee of the ASME Design Engineering Division.

Dr. W. Ghaly is an Associate Professor of Mechanical Engineering with a special interest in the Thermofluids area. He is affiliated with the RQCHP (Réseau Québécois de Calcul à Haute Performance) and a member of the following professional organizations: OIQ, ASME, AIAA, CASI and CSME. He reviewed papers for the ASME International Gas Turbine Institute, Indoor Air Journal, Inverse Problems in Science and Engineering, and Aerospace Science and Technology.

Dr. B.W. Gordon has reviewed papers for numerous control journals

and conferences. He has been awarded a five year NSERC research grant to study distributed simulation and control of mechanical systems. He has also received several research contracts from Defense Research and Development Canada (DRDC) to study vortex based flight control and co-operative control of multiple Unmanned Aerial Vehicle (UAV) systems.

Dr. I. Hassan, Associate professor and Graduate Program Director (until May 31, 2006), has founded the Micro-scale Heat Transfer Research Group at Concordia University, and has collaborated with the aerospace industry in Montreal through PWC, CRIAQ and CIADI. Dr. Hassan has been granted more than \$1,100,000, as a principal investigator, during the last few years through the NSERC, CRD and CFI grants. He has served as external referee for many journals such as: the ASME Journal of Heat and Mass Transfer, ASME Journal of Fluids Engineering, Journal of Microfluidics and Nanofluidics, and The Canadian Journal of Chemical Engineering. He has also refereed many major grant applications. Dr. Hassan was the Session Chair/Scientific Committee Chair for the ASME Third International Conference on Microchannels and Minichannels, which was

held June 13-15, 2005 in Toronto; the Chair/Co-Editor/Scientific Committee for the Third IASME International Conference on Heat Transfer, Thermal Engineering and Environment, which was held August 20-22, 2005 in Greece; a member of the Scientific Committee of the WIT Sixth International Conference on Advances in Fluid Mechanics, which was held in May 2006 in Skiathos, Greece; and Track Co-Chair/Scientific Committee for the ASME Fourth International Conference on Nanochannels, Microchannels and Minichannels, to be held June 19-21, 2006 in Ireland at University of Limerick.

Dr. S.V. Hoa has been President of the Canadian Association for Composite Structures and Materials (CAC SMA) from 1999 to-date. He has been Editor, North America from 1996 to-date of the International Journal of Science and Engineering of Composite Materials. He is co-Chair of Canada-Japan workshop on Composites to take place in Toronto in August 2006; he is on the Advisory Board of the International Conference on Polymer Nanocomposites which took place in Montreal in September 2005, and on the Advisory Board of the Third Asian-Australian conference in Composites

to take place in Hong Kong in 2006. He was invited to give a plenary address at the 20th American Society of Composites conference held in Philadelphia in September 2005. Dr. Hoa was Chair of Concordia Department of Mechanical and Industrial Engineering from 2003-2006. He is the Director of CONCOM (the Concordia Centre for Composites). Dr. Hoa is the Concordia Research Chair Tier 1 in Materials and Composites. Dr. Hoa has, through industrial collaboration with many companies, secured about \$500,000 in industry research grants and contracts to the university in the academic year 2005-2006. He was member of two Networks of Centers of Excellence: AUTO-21 and ISIS (Intelligent Sensing for Innovative Structures). Dr. S.V. Hoa is the NSERC Representative at Concordia University. He is also the representative of Concordia University to the NanoQuébec research network. He is co-director of the Quebec-wide Research Center in Polymers and Composites (Centre de Recherche sur les Polymères et Composites: CREPEC).

Dr. H. Hong is the SAE Faculty Advisor at Concordia University since 1996. Dr. Hong's participation in SAE student activities is because of his commitment to promoting

and developing hands-on experience among all engineering students.

Dr. I. Jasiuk has served on the editorial boards of the International Journal of Solids and Structures (1997-2005), Journal of Mechanics of Materials and Structures (2006-present) and the International Journal for Multiscale Computational Engineering (2004-present). She was elected to the Board of Directors of the Society of Engineering Science (SES) for 2000-2006, served as Vice-President and Chair of Honors Committee in 2005, and in 2006 serves as the President of SES. She is a Fellow of the American Society of Mechanical Engineers (ASME) since 2004. Dr. Jasiuk organized a symposium on "Durability and damage tolerance in heterogeneous materials" at the ASME congress (IMECE 2005). Also, she was a Member of the International Scientific Committee of the International Conference on Science and Technology of Composite Materials COMAT2005. She presented several papers at international conferences: COMAT 2005, 2005 McMAT, and IMECE2005. Finally, during the past year Dr. Jasiuk served on proposal panels for the Department of Energy in the USA and as a reviewer for NSERC

and for several professional journals.

Dr. V.N. Latinovic retired on May 31, 2004, and graduated his last student with Dr. Bhat. He was elected Fellow of the CSME in 1996. He reviewed papers for ASME Transactions – Journal of Manufacturing Science and Engineering, the former Journal of Engineering for Industry, the CSME Transactions, and twenty years for the International Journal of Production Research.

Dr. Y. Lin has joined in May 2005 the CIISE, affiliated with the MIE, specializes in Human Factors Engineering, and has received the NSERC University Faculty Award.

Dr. H.J. McQueen retired early on January 1, 1998, after 29 years. As an alumnus he has organized a project to establish communication with all the Loyola graduates who studied engineering during 1945-1975, when the program was merged with the present faculty. He recently visited the Polytechnic University of Tirrana, Albania, where the books donated by Concordia University are now appearing on the library shelves; books and journals amounting to 4500 kg were collected from engineering professors before they moved to the new building. About 40 years ago his work in transmission

electron microscopy (TEM) helped to establish the theory of dynamic recovery that explains the reduced strength and enhanced ductility of metals in hot shaping processes and also plays a significant role in creep. This theory has recently been criticized on the basis of numerous quantitative measurements of subgrain misorientation by orientation imaging microscopy (OIM). Since the OIM lacks the resolving power of the TEM, his work to show how the results are compatible within the original theory has been explained at several conferences as listed under publications. He presented seminars on hot working of magnesium alloys at the Universities of Erlangen-Nuremberg, of Lecce and of Ancona. He reviewed some dozen manuscripts for journals such as Acta Materiala and Materials Science and Engineering, and was external reviewer for a Ph.D. Metallurgy thesis from McGill University.

Dr. M. Medraj is currently collaborating with IMI-NRC, CANMET and PWC. He is a registered professional engineer in the province of Ontario and a member in ASM, TMS and CSME. He reviewed several articles for the following journals: Journal of Alloys and Compounds, CALPHAD, ASME Journal of Fluid

Engineering, Canadian Metallurgical Quarterly, Journal of Science and Engineering of Composite Materials, and Materials Letters. Also, he is a reviewer for the NSERC Strategic Grants Program. Dr. Medraj holds an NSERC Discovery grant, FQRNT operating and equipment grants as well as being a co-investigator on a CRIAQ project. He is invited to give a presentation on the “experimental work on Mg alloys” at THERMEC’06 conference.

Dr. Sivakumar Narayanswamy joined Concordia University in August 2004, after he was awarded the Tier II Research Chair in Laser Metrology and Micromachining from NSERC. He has 20 publications in international journals and conferences in the area of laser metrology and laser micromachining. In February 2003, he was invited to give a lecture on “Precision Engineering Research conducted at NTU, Singapore” during the IEEE students’ function at Birla Institute of Technology and Science (BITS) in Ranchi, India. Dr. Narayanswamy secured CAD\$200,000 from the CFI and is setting up a laser metrology and micromachining research facility at Concordia to complement the existing MEMS research program. Dr. N. Sivakumar was also

successful in securing CAD\$100,500 of NSERC discovery grant for his research work for five years from 2005 to 2010.

Dr. M. Packirisamy is a member of ASME and is the current Treasurer of ASME Quebec Section. He is a Member of SPIE's International Technical Group on Nanotechnology. He was a Member of the Silicon Allocation Review Committee (SARC) of CMC (Canadian Microelectronics Corporation), as well as a Reviewer for the Journal of Advances in Vibration Engineering of The Vibration Institute of India, the Journal of Sound and Vibration, International Journal of Advanced Manufacturing Technology and Management, SPIE Journal of Microlithography, Microfabrication and Microsystems, Journal of Computational Physics, Journal of Optics Communication, and Journal of Chemistry of Materials. Dr. Packirisamy was the recipient of the I.W. Smith award in 2003 from the CSME (Canadian Society of Mechanical Engineers) for his contribution to MEMS as a Mechanical Engineer. He received a 1 million dollar grant from the Canadian Foundation for Innovation - which is the largest amount ever awarded to an individual by the CFI - to build MEMS fabrication facilities that should put the university in the

vanguard of this exciting new field. He was also successful in obtaining a 1.5 million dollar grant for developing optical MEMS devices. He received the Best Researcher Award for 2006 from the Department.

Dr. M. Paraschivoiu is a Fellow of the CSME, a Member of the Board of Directors of CSME, and the Chair of the CSME student paper competition. His area of research is Computational Fluid Dynamics. He was invited to give a scholarly address at the University of Alberta in October 2005. He reviewed papers for the AIAA Journal of Aircraft and for the CMAME. He is also an Adjunct Professor in the Department of Mechanical and Industrial Engineering at the University of Toronto.

Dr. M.D. Pugh reviewed papers for the Journal of Manufacturing Processes, the Journal of Materials Science, and he reviewed research grants for NSERC. He is a Licensed Member of Professional Engineers of Ontario, and a Member of ASM International (American Society for Materials). He is an Adjunct Professor in the Department of Metals, Materials and Minerals Engineering at McGill University. He received the ENCS Faculty Teaching Excellence Award in 2005.

Dr. S. Rakheja's research

accomplishments have been recognized by Concordia University, which bestowed him with the honour of the Senior Research Fellow of Concordia University for 2005. He was appointed as the Concordia University Tier 1 Research Chair in Vehicular Ergodynamics in 2001. His recent research work on vibration energy absorption into the human hand and arm received the Dr. Alice Hamilton Award in Engineering and Physics, awarded by the US National Institute for Occupational Safety and Health (NIOSH). His work on hand-tool interface loading received the best paper award from Liberty Mutual Insurance (USA). Dr. Rakheja's other works in the area, performed jointly with researchers at IRSST (Québec) and NIOSH (USA), have been adapted into international draft standard ISO/CD 15230 (2004) and into the revisions proposed by EC and ISO committees CEN/TC 231/WG3 (2005) and EN ISO-10819. He is currently serving in the Editorial Boards of the International Journal of Industrial Ergonomics, International Journal of Heavy Vehicle Systems, and the Journal of Automobile Engineering of the Institution of Mechanical Engineers (UK). Dr. Rakheja has also served in the Advisory Editorial Board of the Encyclopedia of Vibration. He is serving as a member of the Advisory

committee to the Canadian Standards Council. Dr. Rakheja has also served as the Chair of the Transportation Division of the Canadian Society of Mechanical Engineers, and is continuing to serve as a member of the Vehicle Design Committee of the American Society of Mechanical Engineers.

Dr L. Rodrigues has served as a Reviewer for the IEEE Transactions on Automatic Control, IEEE Transactions on Control Systems Technology, IEEE Transactions on Circuits and Systems, IEE Proceedings on Control Theory and Applications, Automatica, International Journal of System Science, International Journal of Control and Intelligent Systems, IEEE Conference on Decision and Control, IEEE American Control Conference, IEEE Mediterranean Control Conference and IFAC Conferences. He has also been a Reviewer for NSERC grant applications. Dr. Rodrigues is a Member of the IEEE and AIAA associations. He has received an NSERC discovery grant of \$20,370/year for 2004-2009 and a NATEQ nouveaux chercheurs grant of \$14,540/year for 2005-2008. Dr. Rodrigues has been an invited speaker for the International Conference of Hybrid Systems and Applications in May 2006.

Dr. R. Sedaghati was the Reviewer for the following journal papers in 2005: AIAA Journal, International Journal of Solids and Structures, Journal of Science and Engineering of Composite Materials, Journal of Nonlinear Dynamics, CASI Journal, Journal of Intelligent Material Systems and Structures and also Reviewer of proposals for NSERC Discovery grant. Dr. Sedaghati has strong collaboration with Canadian Space Agencies (CSA) and Bombardier Inc (through CRIAQ project-MOSAIC). He has industrial contracts with CSA in fields of force limited vibration testing and output-only modal testing. Dr. Sedaghati was the recipient of the Department of Mechanical and Industrial Engineering research excellence award in 2005 and the recipient of the Canadian Society of Mechanical Engineering award (Concordia University Chapter) for teaching excellence in 2005. He is a registered professional engineer and member of PEO, CSME, ASME and AIAA.

Dr. K. Siddiqui is a member of the Canadian Society for Mechanical Engineering, the American Society of Mechanical Engineers, as well as the American Geophysical Union. He is serving in the members committee of the CSME and the executive committee of the ASME Quebec Section. He served

as reviewer for Geofizika, Heat and Mass Transfer, and the Journal of Automobile Engineering. He was the Session Chair for CANCAM 2005.

Dr. I.G. Stiharu was one of the founding members of the ASME International - Quebec Section and he continues to work closely with the executive committee of the Section. He was the Reviewer for NSERC Discovery Grant Committee GSC-13 – Mechanical Engineering from 2002 to 2005. He is presently a reviewer for the EPSRC, the science and engineering granting agency in the U.K. Dr. Stiharu was the invited editor of the International Journal of Heavy Vehicle Design – special issue on Intelligent Vehicle Systems in 2005 which has been published in 2006. He was a Program Committee Member for MEMS, MOEMS and Micromachining (EPE106) for the SPIE International Symposium on Photonics (Europe) in Strasbourg from April 5 to 8, 2006. He is the Chair of NATO Research and Technology Organization AVT-128 on “Intelligent Gas Turbines” from 2003 to 2008, as well as Member of the NATO-RTO Task Group TG-119 “Ammunition Monitoring” from 2003 to 2006. He is the Organizer of the Lecture Series AVT-129 on “Nanotechnology Aerospace Applications”

which will be held at Concordia on October 19 and 20, 2006; this will be the sole Canadian stop of this lecture series/conference.

Dr. C.-Y. Su is currently serving as Associate Editor for IEEE Transactions on Automatic Control, IEEE Transactions on Control Systems Technology, and Journal of Control and Applications. He is also serving on the Editorial Board of Mechatronics: An International Journal, and the International Journal of Intelligent Systems Technologies and Applications. He is Guest Editor of the Special Issue on "Multi-vehicle Systems Cooperative Control with Application", the IEEE Transactions on Control Systems Technology, 2005-2006, and he is Guest Editor of the Special Issue on "Advances in Smart Materials and Structures" of the Transactions of the CSME for 2006-2007. Dr. Su is Program Chair of the 16th IEEE Conference on Control Applications (CCA2007) to be held October 1-3, 2007 in Singapore; General Co-Chair of the 2006 International Conference on Dynamics, Instrumentation and Control to be held August 13-16, 2006 in Queretaro, Mexico; Conference Chair of the Eighth IASTED International Conference on Control and Applications (CA 2006) to be held May 24-26, 2006 in Montreal, Canada; Program Committee Chair

of the International Conference on Sensing, Computing and Automation (ICSCA2006), in Chongqing, China to be held May 8-11, 2006; and Publicity Chair for the IEEE International Symposium on Intelligent Control to be held October 4-6, 2006 in Munich, Germany. Dr. Su was Publications Chair for the IEEE International Conference on Networking, Sensing, and Control (ICNSC 2006) which was held in Ft. Lauderdale, Florida in March 2006. In addition, he is/was a member of the Technical Program Committee of 14 international conferences during 2005-2006. He Reviewed some fifty manuscripts for journals, and was External Reviewer for proposals of Defence R&D Canada (DRDC) and City University of Hong Kong, as well as a Ph.D. thesis from Nanyang Technological University in Singapore in 2005. Dr. Su was appointed for 2001 - 2006 to a Tier-II Concordia Research Chair and he was Guest Professor at Huazhong University of Science and Technology in 2005 and at Northeastern University in China in 2006.

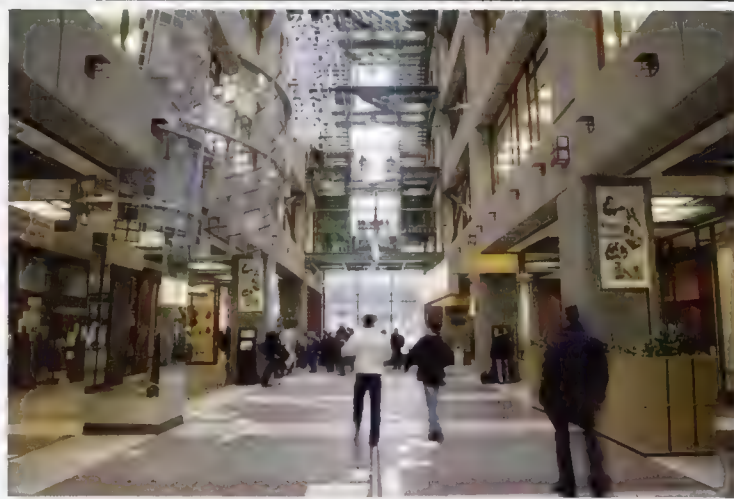
Dr. G.H. Vatistas is a Fellow of the Canadian Society for Mechanical Engineering. He is a Senior Member of The American Institute of Aeronautics and Astronautics (AIAA). He was a Reviewer for

several Journals. Dr. Vatistas is on the Editorial Board of the Transactions of the CSME. He is an Invited Lecturer and a Member of the Scientific Committee for the International Symposium "Science and Technology in Homer's Epics", to be held August 27-30, 2006, in Ancient Olympia, Greece.

Dr. P.M. Wood-Adams was awarded the NSERC University Faculty Award in 2001 allowing her to focus on research activities; this award was renewed in 2004 for the maximum possible 2 years. She was appointed a Concordia University Research Chair Tier II 2006-2011 on "The Physics of Advanced Materials". She received the PetroCanada Young Innovator Award for 2005 for "Development of Foaming Technology for Polylactide". She was an invited speaker at the University of Alberta in September 2005. She has been a member of the editorial board of the Journal of Applied Polymer Science since 2002. Dr. Wood-Adams was a Co-Chair of a special session at the Annual Meeting of the Society of Rheology in Vancouver in 2005.

Dr. W.F. Xie has reviewed some papers for IEEE Transactions on Industrial Electronics, IEEE Transactions on Neural Network, IEEE

Transactions on Control System Technology, and European Journal of Control. She served as a Reviewer for several conferences including: IEEE Control Systems Society Conference Management System; and 4 papers for 2006 IEEE/RSJ-IEEE International Conference on Intelligent Robots and Systems. She reviewed the proposal for the Atlantic Innovation Fund (AIF). Dr. Xie has been awarded a five year NSERC research grant to study High Precision Control of Imperfect Actuators over Wide Environment Range. She was also awarded the Research Tools and Instrumentation Grant from NSERC in 2005. She was awarded seed funding from joint Faculty of Fine Arts and Faculty of Engineering and Computer Science. Dr. Xie is the Organizational Chair of NAFIPS'06, which was held June 3-6, 2006 at Concordia. Dr. Xie serves as a Section Chair for the 2006 American Control Conference. She is the Publication Chair of the 2007 IEEE International Conference on Systems, Man, and Cybernetics. Dr. Xie is a member of IEEE and CSME and Professional Engineers of Ontario.



Atrium of the LB building

RESEARCH AREAS

SYSTEMS AND CONTROL

Description

Research involves computer modelling and simulation, and laboratory and field testing of road, rail, off-road, and tracked vehicles; and development of user friendly expert system based software packages for cost effective analysis and design of vehicle systems and sub-systems, and various CAD/CAM activities using the micro- and mini-computers and workstations for the design and manufacturing of mechanical components and their quality assurance.

Scope of Work

Research and development on vehicle system design; ride dynamics of ground vehicles; handling and stability of road vehicles; heavy vehicle dynamics; guided vehicle systems; vehicle chassis/frame design; robotic and driverless vehicles; intelligent vehicle-highway systems; and vehicular engines and control. Development and evaluation of methodologies and software tools on micro- and mini-computers for the analysis and optimized

design of mechanical components; online adaptive machining and quality control techniques.

Facilities

Fully instrumented multi-axes vehicle vibration test centre with five servo-hydraulic actuators capable of shake testing multi-wheeled vehicles; instrumentation and measurement laboratory equipped with data acquisition system, modal analyzer, FFT real-time analyzer, FM recorder, and various instruments; digital computer and computer-aided design facilities, VAX, Silicon Graphics, and Apollo Workstations, SDRC: I-DEAS CAD Software, and finite element analysis software. Vehicle and large scale structure testing laboratory with five long stroke servo hydraulic vibration exciters; Mechanical Vibrations Laboratory with large pay-load, low frequency, long stroke electrohydraulic shaker; instrumentation for noise and vibration analysis and shock testing.

Faculty

A.A. Bulgak
Performance Evaluation, Design Optimization and Economics of Flexible Manufacturing/Assembly Systems, Just-in-time Manufacturing Systems,

Adaptive/Predictive Scheduling of Flexible Manufacturing Systems, Quality and Productivity Improvement, Stochastic Optimization.

M. Chen

Ph.D. (Manitoba)
Manufacturing System Analysis, Applied Operations Research, Applications of Network Analysis to Manufacturing, Transportation and Communication System Design and Analysis, Applications of Combinatorial Optimization, Production Planning and Inventory Control.

B.W. Gordon

Distributed Simulation, Distributed Control Systems, Control of Internal Combustion Engines, Telerobotics, Mobile Robots, Unmanned Aerial Vehicles (UAVs), x-by-Wire Control Systems, Virtual Environments, Real-time Systems and Network Communication.

H. Hong

Magnetic-core Solenoid Operated, Voice Coil Operated, and Piezo-actuator Operated Vehicular Variable Valve Actuation and Alternative Fuel Injectors.

S. Rakheja

Semi-active and Active Vibration Control, Vehicle

Dynamics, Ergonomics, Hardware-in-the-loop Simulation of Nonlinear Systems.

L. Rodrigues

Switched, Hybrid and Optimal Control with applications to Aerospace (especially Unmanned Vehicles), Automotive, Manufacturing and Biological Systems (especially the Vocal Tract).

I. Stiharu

Micro Electro-Mechanical Systems, Microsensors and Microactuators, High Precision Mechanics, Dynamical Design and Manufacturing, Microtribology and Tribology, Nonconventional Lubrication Methods, Microsensors (Acoustic, Acceleration, Pressure, Humidity), Intelligent Vehicle Systems, Vehicle Dynamics, Human Vibration.

C.-Y. Su

Control techniques for Smart Material based Actuators, Robust/adaptive Control of Nonlinear Systems, Robotic and Mechatronic Systems.

W.F. Xie

Nonlinear Control in Mechatronics, Active Control of Vehicle Shimmy, Model Predictive Control, Induction Motor Control, Visual Servoing and Tracking, Soft Computing Techniques- Fuzzy Logic, Neural Networks and Genetic Algorithm.

Typical Projects

Monitoring and analyzing noise and vibrations of industrial machinery, including thermal and fourteen vibratory stresses; preventive maintenance routines; analysis and design of energy absorption devices for critical vibrations in machinery elements; unbalance response in rotating machinery bearing and gear dynamics; acceptance tests for machine tools; evaluation of surface roughness of manufactured components and its influence on fatigue, bearing strength, and lubricability; off-road vehicle seat suspension; active and semi-active suspension; shock isolators; CAD of complex mechanical systems through interactive graphics and finite element analysis. Light aircraft flight simulation; electrohydraulic servactuators for flight control; modelling of transient flow and automatization of fuel in supply system of gas turbine engines; diesel engines and spark ignition engines with fuel injection; design of fuel control units with different governing systems, particularly for alternate fuels; multi-arm robotic workstation with camera vision; use of parallel processors in complex robotic control systems; development of driverless vehicles (AGV) for manufacturing operations guided by

camera vision; adaptive control of AGVs for accurate tracking and parking; adaptive control of electrohydraulic systems with new valve configurations. Application of linear induction motor in flexible manufacturing system; and robotic palletization applied to modern industry. Micromachined sensors for space applications (tactile imager, pressure micro-sensor) using bulk Si machining; surface micromachined sensors using standard CMOS fabrication provided by the CMC, providing along with the sensor structure, the integrated electronic conditioning circuitry (acoustic intensity sensor, humidity sensor). Implementation of "smart" sensors in process control schemes. Robust control of uncertain nonholonomic mechanical systems; control of dynamic systems involving hysteresis nonlinearities; intelligent systems for precision manufacturing; piezo-actuator-assisted rough and ultra precision turning shafts; intelligent control of nonsmooth dynamic systems.

THERMO-FLUID AND COMPUTATIONAL FLUID DYNAMICS

Description

Research involves experimental, analytical and computational work in fundamental fluid mechanics, aerodynamics, vortex dynamics, flow instabilities, combustion, heat transfer, two-phase flow, micro-thermal devices, heat pumps, shock dynamics, in-flight on aircraft and engines and turbomachinery.

Scope of Work

The thrust of research in the thermofluid area is divided into four parts: the generation of new knowledge; its application to industrial designs for the benefit of society; to form the future researchers; and service to the community. Experimental and analytical work into fundamental aspects of fluid mechanics, thermodynamics and heat transfer provide the new knowledge required to improve industrial designs. Multidisciplinary optimization adds value to design systems. Development of modern computational techniques for transonic and super-sonic aerodynamics, gas turbines; phase-change, heat transfer processes; design and testing of solar

heating and cooling systems; and numerical methods in steady unsteady compressible viscous flows aids the entire mission. Development of modern computational techniques and benchmark data for transonic and super-sonic aerodynamics, gas turbines, phase-change, and heat transfer processes; design and testing of solar heating and cooling systems; numerical methods in steady unsteady compressible viscous flows. Development of modern design tools and optimization schemes for the gas turbine rotating components, namely the compressor and turbine components. Develop analytical and numerical tools for unidirectional flows in simple configurations. Study some mass transfer problems relating to indoor air quality. Development of mathematical models for thermo-fluids aspects of nano-technology. We are aiming at finding the optimal conditions of the formation of carbon nanotubes, proposing appropriate computational tools, and discovering fluid physics features crucial for this technology. The considered processes of production of nano-tubes are laser ablation (LA), chemical vapor deposition (CVD), and decomposition of high-pressure carbon oxide (HiPco). All processes are controlled by metal catalyst particles that initialize synthesis of carbon nanotubes from the feedstock gas.

Development of a theoretical and numerical model of noise generation and amplification due to the presence of noise sources in the vicinity of a lifting body (helicopter blade and airfoil). Development of CFD models for flight simulators. The CFD modeling of separated flows makes it possible to obtain computational data for complex flight regimes, such as longitudinal/lateral dynamics, maneuvers, slow and subsonic flight, the influence of ground effect, etc. CFD modeling of PV-integrated facades for the cogeneration of the electric and thermal power and daylight utilization. The research is focused on the development of novel dynamic systems for building facades to utilize incident solar energy for a simultaneous production of the thermal and electric power. Development of the parallel wavelet-based AMR algorithm to relevant engineering problems, wherein the physics has intrinsic multiple scales and is computationally very challenging. The unique feature of the wavelet-based AMR algorithm is that it combines the advantages of both unstructured and structured grid refinement algorithms, i.e., the ability of the local grid refinement/coarsening and the use of a structured grid connection of neighboring grid points for an efficient load balancing. In this research, we propose a parallelization strategy for the novel

wavelet-based adaptive mesh refinement algorithm. Development of modern fluid and thermal measurement techniques to investigate fluid dynamical and heat transfer processes in natural and industrial flows. Development of tools and techniques to obtain accurate and reliable thermo-fluid measurements in micro-devices.

Facilities

Computational Fluid Dynamics Applications Lab; Wind Tunnels; Fluid Dynamics Laboratory; Thermodynamics Laboratory; Solar Research Laboratory; Heat Pump Laboratory; Combustion Laboratory; Shock Wave Dynamics Laboratory and associated instrumentation; computers, several Silicon Graphics parallel computers and workstations, and access to supercomputers. Liquid coating technology including paper coating technology.

Faculty

A. Dolatabadi

Computational Fluid Dynamics, Two-phase Flows, Thermal Spray Coatings, Liquid Spray and Atomization, Microfluidics.

N. Esmail

Fluid Mechanics and Rheology, Liquid Coating Processes, Pulp and Paper, and Micro-fluidics.

W.S. Ghaly

Aerodynamic Optimization, Inverse Blade Design, High Speed Aerodynamics, Convective Heat and Mass Transfer, Indoor Air Quality.

I.G. Hassan

Micro Fluidics, Thermal MEMS, Heat Transfer, Multiphase Flow, CFD and DSMC Applications.

M. Paraschivoiu

Computational Fluid Dynamics, Large Eddy Simulations, Hydrogen Energy, Wind Energy.

K. Siddiqui

Fluid Mechanics, Heat Transfer, Wave Dynamics, Acoustics.

G.H. Vatistas

Fluid Mechanics, Vortex Dynamics, Flow Instabilities, Computational Fluid Dynamics, Experimental Aerodynamics, Lubrication, Microgravity Fluid Mechanics, Thermodynamics, Haemodynamics, Numerical Methods.

Typical Projects

Concordia Industrial Consortium on In-Flight Icing; Concordia Industrial Consortium on Large-Scale CFD; computational fluid dynamics of viscous flows over airfoils, wings, and in gas turbine compressors; turbines and ducts; resonance phenomena and their application; finite element computational

aerodynamics methods for gas turbines; iterative methods for large-scale CFD problems; parallelization; mesh optimization; air and solar source heat pumps; air conditioning systems; heat and mass transfer in porous media; energy transfer in confined vortex flows; testing of supersonic flows in compressor cascades; plasma dynamics; environmental hazard predictions. Inverse design and optimization methods for turbomachinery blading and for aircraft wings. Aerodynamic loss prediction and loss modeling in transonic turbines.

MATERIALS AND COMPOSITES

Description and Scope of Work

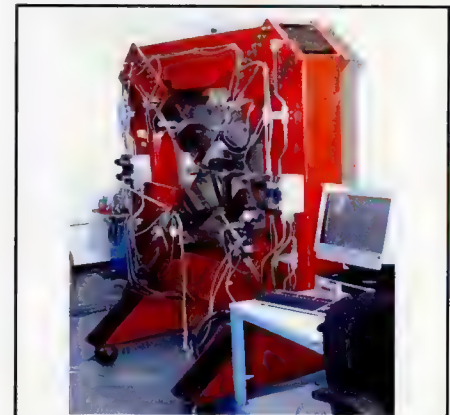
Composites structure and materials activities at Concordia University consist of filament winding of thermoset and thermoplastic matrix composites; resin transfer molding; induction heating for joining and repair; compression molding of thermoplastic composites; autoclave curing and braiding; development of special finite elements for stress analysis of composites; modelling for deformation and residual stresses in curved composite pieces;

fracture and fatigue of composite materials and structures; non-linear mechanics of composite materials and structures; vibrations of composite structures; stochastic mechanics of composite materials and structures; and development of nanocomposites. Polymer physics research at Concordia University comprises the study of the relationship between molecular structure and melt rheology; the development of molecular models for industrial plastic materials; and the study of the dynamics of polymer nanocomposites. Development of modern fluid and thermal measurement techniques to investigate fluid dynamical and heat transfer processes in natural and industrial flows. Development of tools and techniques to obtain accurate and reliable thermo-fluid measurements in micro-devices. Metal-ceramic joining between silicon nitride engineering ceramics and iron-based intermetallics is being developed. Wetting analysis of metals on ceramics for joining and also for metal matrix composites. Effects of fibre damage during manufacture of glass fibre reinforced plastics are being measured. Hot working of metals encompasses the dependence on temperature and rate of the micro-structural evolution, the ductility, the strength

and the product properties for HSLA and stainless steels, for magnesium alloys and for aluminum alloys and composites; and simulation and modelling of multistage rolling and of extrusion.

Facilities

Compression and torsion tests by means of microprocessor controlled equipment; optical and electron microscopy with quantitative image analysis; composite materials fabrication equipment such as autoclave; resin transfer molding machine; filament winding machine; braiding machine; compression molding press; induction heating machine; laser; MTS fatigue testing machine; Axial-torsion testing machine; environmental chamber; photoelastic polariscope; acoustic emission instrumentation; ultrasonic instrumentation; strain gage facilities; torsion test. Stress pattern analysis using thermal emission; coefficient of expansion measurement instrumentation; long distance microscope; biaxial testing machine; creep testing machine for composite structure; environmental chambers; compression grips; shear fixture; DMA; DEA; DSC; FT-IR viscometer; atomic force microscope; polymer shrinkage modulus machine; surface profilometer; rheometer; nanoindenter; micro fluidizer.



Biaxial testing machine in Composites Lab



Braiding machine – Composites Lab

Faculty

R. Ganesan
Concordia Research Chair.
Finite Element Method,
Boundary Element
Method, Vibrations and
Machine Dynamics,
Composite Materials and
Structures, Stochastic
Processes in Materials and
Mechanics, and Random

Vibrations.**S.V. Hoa**

Composite Materials and Structures, Materials Development, Testing and Evaluation, Non-Destructive Testing, Analysis and Design, Nanocomposites.

**M. Hojjati
(Adjunct Professor)**

Composites Manufacturing.

I. Jasiuk

(joined June 2004;
resigned Dec. 31, 2005)

Micromechanics, Mechanics of Materials (Composite Materials, Nanocomposites, Biomaterials), Bone Mechanics, Elasticity, Fracture.

M. Medraj

Light Metals, Magnesium Alloys Development, Metal Matrix Composites, Computational Thermodynamics, Phase Diagrams, Nanostructured Materials.

H.J. McQueen

Hot working of metals, and energy conservation in manufacturing. High temperature deformation of aluminum matrix composites to determine the effects of reinforcing particles on the strength, on the cracking and on the micromechanisms of plastic flow in the matrix; this information is utilized in computer modeling of extrusion with different die ratios and preheat temperatures.

M.D. Pugh

Metal-ceramic Joining, Metal matrix Composites, Pultrusion of Composites, Nanocomposites, Materials, Microstructure-Processing-property Relationships.

N. Sivakumar

Canada Research Chair Tier II. Laser Metrology – Laser Interferometric Measurement of Surface Profile, Vibration, and Sub-surface Defect Detection. Laser Micromachining – Direct Laser Ablation using Interference Principle for Reduction of Feature Size, 2D and 3D Photonic Devices Fabrication.

P.M. Wood-Adams

Polymer Structure – Property Relations, Polymer Dynamics, Polymer Rheology, Thin Films, Surface Science, Rheometry, Physical Characterization of Materials, Atomic Force Microscope, Nano-indenter, Crystallization.

**M.T. Ton-That
(Adjunct Professor)**

Nanocomposites.

Typical Projects

Simulation of a hot reversing bar and planetary mills; measurement of flow stress during passes and of softening between passes for stainless steels, carbon steels and high strength low alloy steels. Fatigue and fracture of graphite/epoxy composites; effect of stress

concentration on fracture strength of composite under uniaxial and biaxial loading; effect of water absorption on the mechanical behavior of SMC and of graphite/epoxy composites; design methodology; acoustic emission testing of composites; repair of thermoplastic matrix composites; recycling of thermoset composites; composites in building structures; effect of liquid chemical exposures on mechanical properties of composites used in chemical processing equipment; composite highway tanker; composite triax characterization; development of nanocomposites; and thermoplastic composites. Measurement of slow relaxation processes in polymer melts; effect of polymer molecular structure on thermorheology; rheological characterization of polymer molecular structure; and dynamics of polymeric nanocomposite materials.

VEHICLE ENGINEERING

Description

Concordia Centre for Advanced Vehicle Engineering (CONCAVE) Research is engaged in all aspects of road and off-road transport systems,

including intelligent vehicles, vehicular ergodynamics, micro sensors and micro-mechanical systems for varying applications. The group is also involved in various research projects in the domain of haptic sensing, smart structures for space applications, MEMS and optical MEMS.

Scope of Work

Studies in transport systems encompass interdisciplinary activities involving: dynamic behavior of the system; interactions of the transport system with the human driver, road and the environment; human comfort and performance; and development and integration of reliable micro-sensors and controllers for enhancement of various performance measures. The primary research activities focus on development of novel methodologies and assessment methods involving: vehicle ride dynamics; human comfort; human responses to vibration and shock; design and fabrication of micro-sensors and actuators; optical micro electro mechanical systems (MEMS); haptic sensors and actuators; vehicular ergodynamics; acoustics and photo-acoustics; human-adaptation of the vehicle-road-environment system; semi-active and active vehicle systems; magneto-

rheological fluid suspension and control system; directional dynamics and stability of freight vehicles; smart structures; intelligent vehicle systems; and modeling of human perception and reaction under emergency situations.

Facilities

The center is equipped with four major laboratories. The micro-electro-mechanical systems (MEMS) laboratory is equipped with CADENCE, MEMSPRO and ANSYS software for design and analysis of micro systems and devices, photolithography, thin-film deposition, excimer laser micro-fabrication system and post-processing infrastructure for etching, packaging and testing of MEMS. The human vibration laboratory is equipped with a whole-body vehicular vibration platform, seating dynamics testing systems, whole-body horizontal vibration platform, hand-arm vibration test systems, human-machine interface pressure measurement systems, and measurement and signal analyses systems. The vehicle vibration test facility comprises an instrumented multi-axes vibration test system with five servo-hydraulic actuators capable of shake testing multi-wheeled vehicles, instrumentation and

measurement systems with data acquisition system, modal analyzer, FFT real-time analyzer, FM recorder, and hardware-in-the-loop vibration platform for assessment of highly nonlinear components and tuning of real-time controllers. The graduate students' computing laboratory is equipped with various workstations and software, such as TRUCKSIM, CARSIM, ANSYS, ADAMS, CADENCE and MEMSPRO.

Faculty

A.K.W. Ahmed

Road and Railway Vehicle Dynamics, Vibrations and Control, Intelligent Vehicle Systems.

R.B. Bhat

Random Vibrations, Rotor Dynamics, Structural Acoustics, Dynamics of MEMS Devices.

P.-É. Boileau (Adjunct)

Vehicle Ride, Driver Ergonomics, Seating, Vibration Exposure Assessment, Human Response to Whole-body Vibration, Hand-arm Vibration, and Biodynamics and Modelling.

J. Dargahi

Smart Sensors and Systems, Sensors and Actuators, Tactile Sensing, Micromachining, Medical Robotics, Robotic Sensors, Haptic Sensing and Feedback Systems, and Teletaction in

Minimally Invasive Surgery.

M. Packirisamy

MEMS, Microfabrication, Optical Microsystems, Dynamics of Microsystems, Fuzzy System Identification.

S. Rakheja

Vehicle Dynamics, Vibration, Whole-body and Hand-arm Vibration, Human Vibration, Seating Dynamics, Directional Dynamics and Stability of Heavy Vehicles, Vehicle Ergodynamics.

R. Sedaghati

Adaptive Structures and Vibration Control using Smart Materials, Structural Design Optimization and Computational Mechanics (Finite Element Method), Force Limited Vibration Testing, Piezoelectric Laminated Composites, Design Optimization of Thin-Walled Composite Structures, Design and Modeling of Piezoelectric Sensors and Actuators.

I. Stiharu

Micromechatronics, Micro-sensors for Automotive Applications, Driver-vehicle Interaction, Intelligent Vehicles.

Typical Projects

Development of dynamic simulation model for predicting ride and shock performance of road and off-road vehicles; driver-adaptive vehicle systems; advanced suspensions; dynamics of railway track/vehicle systems;

analytical and experimental investigations on hand-arm vibrations; biodynamics of the seated occupant exposed to whole-body vibration; bidynamics response of the human hand-arm exposed to vibration; attenuation of hand-transmitted vibration; hand responses to dynamic loading; directional dynamics of articulated heavy vehicles and tank trucks; design and analyses of smart structures; micro-sensors and micro-mechatronics; micro-air-quality sensing system; micro-fabrication techniques; intelligent vehicles; prediction of vehicle rollover; driver-vehicle interactions; spectral classification of vehicular vibration; dynamic road loads of commercial vehicles; performance measures for heavy vehicles; micro-sensors for automotive applications; integrated sensors and actuators; and micromachining.

**INDUSTRIAL
ENGINEERING**

Description

Industrial and mechanical engineering expertise and knowledge are applied to systems and designs involving human and inanimate components. Research involves

modelling and simulation of industrial systems, human-machine interfaces, as well as applications to industrial practice.

Scope of Work

Areas of investigation include analysis; design; manufacturing and engineering testing; modelling related to orthopaedics, rehabilitation and man-machine interaction; and basic human characteristics suitable to human-machine system design. Design, mathematical analysis and experimental evaluation of graph, discrete, and Monte Carlo optimization algorithms are used to address problems arising in industrial applications. These problems include: scheduling and sequencing of jobs; design of flexible assembly systems; network reliability analysis; vehicle routing such as the travelling salesman problem; and circuit layout. Studies are also directed to queuing networks and queuing network modelling of large systems such as manufacturing and computer systems. Investigation of reliability of mechanical systems using direct and indirect methods is considered. Quality and productivity improvement issues in manufacturing systems are studied.

Facilities

Human factor and bioengineering laboratory; material handling

laboratory; integrated manufacturing laboratory; laser optics laboratory; vibration laboratory; vehicle testing laboratory; and computing and data acquisition/analysis systems.

Faculty

A. Akgunduz

Virtual Reality based Product Design; Customer Assessment; Customer Assessment for Product Design; and Revenue Management in Airline Industry.

N. Bhuiyan

Operations management, particularly in new product development processes. Research related to operational issues dealing with the design, development, production, and distribution of goods and services, with a focus on emerging tools and techniques in product/process design and development, design and manufacturing technologies, information management, and methods for integrating design and manufacturing to improve process performance.

A.A. Bulgak

Modelling, Performance Evaluation, Design Optimization, and Economics of Flexible Manufacturing/Assembly Systems and of Call Centers, Design and Optimization of Supply Chain Networks, Stochastic Optimization, Quality and Productivity Improvement, Reliability,

Availability, and Maintainability in Ship Operations, Design and Analysis of Computer Integrated Manufacturing Systems.

M. Chen

Manufacturing System Analysis and Design, Reverse Supply Chain, Quality Improvement, Service System Optimization.

Z.C. Chen

CNC Machining, Computer-aided Design, Machining Intelligence.

K. Demirli

Fuzzy logic based reasoning and its applications to mobile robots and industrial engineering problems.

G.J. Gouw

Human Factors Engineering, Ergonomics, Safety.

Typical Projects

Group technology decision aids used in the design of cellular manufacturing. Expert system design for facilities planning, for material handling and for equipment selection. Hand-arm vibrations; whole body vibrations; safety of footwear; analysis of manual materials handling; human body modelling; man-machine interaction and driver comfort in vehicle engineering; development of antivibration seat; ergonomic aspects of operator facilities and information display;

helmet mounted display; design of heavy vehicle simulators to test operator safety and ergonomics; influence of freezing on human tissues; indirect calorimetry; robotic devices for the handicapped; plant design criteria against explosion hazards; timetable and task scheduling; travelling salesman and routing problems; assembly-line balancing; topological design of computer works; flow control problems in computer networks; probabilistic methods for reliability estimations for industrial machinery and production lines; failure forecasts for equipment and operation; integrated performance evaluation models for design and analysis of flexible assembly systems; analysis of the impact of quality improvement on the performance of manufacturing systems; and minimizing total cost in job shop scheduling. Stability of pallet loads; optimal blade arrangement and stacking angles in gas turbine assembly and its relationship with tolerancing; and design of an electric wheelchair. New product development process improvement; performance evaluation of new product development processes; quality improvement systems; design of a materials handling system; analysis of coordination and communication in new product development processes; and ISO 9000 quality frameworks.

STUDENT ACHIEVEMENTS

Ordered by award title
(ascending), then by
lastname (ascending).

Canada Steamship Lines Inc. Award in Transportation Studies

Bijan Jowkar Derisi, Ph.D.

Canadian National Award in Transportation Studies

Rajib Ul Alam Uzzal,
M.A.Sc.

Carolyn and Richard Renaud Graduate Teaching Assistantships

Vaibhav Rawat, M.A.Sc.

Concordia University Campaign for a New Millennium Graduate Scholarships – School of Graduate Studies

Bijan Jowkar Derisi, Ph.D.

Concordia University Campaign for a New Millennium Student Contribution Graduate Scholarship – Engineering & Computer Science

Saeed Sokhanvar, Ph.D.

Concordia University External Grant Holder Doctoral Scholarships

Behzad Samadi Arakhsh
Bahar, Ph.D.

Yu Feng Wang, Ph.D.

Concordia University Graduate Entrance Fellowships

Mohammad Aljarrah,
Ph.D.

Steven Farber, M.A.Sc.

Robert Liegl, M.A.Sc.

Rajib Ul-Alam Uzzal,
M.A.Sc.

Concordia University Graduate Fellowships

Dong Pu Cao, Ph.D.

Mohamed Fayed, Ph.D.

Qiang Fu, Ph.D.

Behzad Samadi Arakhsh
Bahar, Ph.D.

Nima Tajallipour, M.A.Sc.

Enrong Wang, Ph.D.

Hong Wang, M.Eng
Aerospace

Concordia University Graduate International Tuition Fee Remission Awards

Steve Ah Kioon, Ph.D.

Mohammad Aljarrah,
Ph.D.

Sanaz Arabzadeh Esfarjani,
M.A.Sc.

Hadi Babaei, Ph.D.

Dong Pu Cao, Ph.D.

Alebachew Dessu Yimer,
Ph.D.

Mohamed Fayed, Ph.D.

Qiang Fu, Ph.D.

Tamanna Howlader,
M.A.Sc. Izadi

Hojjat Allah, Ph.D.

Majid Nabavi, Ph.D.

Mehrdad Pakmehr, Ph.D.

Reza Pedrami, Ph.D.

Amandeep Singh, M.A.Sc.

Nima Tajallipour, M.A.Sc.

Stefan Ionut Tuineag,
Ph.D.

Shengji Yao, Ph.D.

Yury Yuryev, M.A.Sc.

**Concordia University
Partial Tuition
Scholarships for
International Students**

Muhammad Ashraf-Ul-
Arafin, M.A.Sc.

Hadi Babaei, Ph.D.

Md. Mezbahul Islam,
M.A.Sc.

Fantahun Melaku Defersha,
Ph.D.

Reza Pedrami, Ph.D.

Vaibhav Rawat, M.A.Sc.

Amandeep Singh, M.A.Sc.

**Faculty of Engineering
and Computer Science
Graduate Scholarships**

Kasra Daneshkhah, Ph.D.

**Female Doctoral Award
Ministry of Education of
Ontario**

Niyusha Samadi, Ph.D.

**Fonds Québécois de la
Recherche sur la Nature
et les Technologies
(NATEQ) Graduate
Fellowships**

Yu Feng Wang, Ph.D.

**John W. O'Brien
Graduate Fellowship**

Saeed Sokhanvar

**J.W. McConnell
Memorial Graduate
Fellowships**

Bijan Jowkar Derisi, Ph.D.

**Ministère de l'Éducation,
du Loisir et du Sport –
Bourse d'Excellence pour
Étudiants Étrangers**

Behzad Samadi Arakhsh
Bahar, Ph.D.

**Natural Sciences and
Research Council
Scholarships (NSERC) –
PGS-M**

David H. May, M.A.Sc.

**Natural Sciences and
Research Council
Scholarships (NSERC) –
Canada Graduate
Scholarships – Master's**

Steven Farber, M.A.Sc.

**Port of Montréal Award
in Transportation Studies**

Bijan Jowkar Derisi, Ph.D.

**Power Corporation of
Canada Graduate
Fellowships**

Bijan Jowkar Derisi, Ph.D.

Niyusha Samadi, Ph.D.

Saeed Sokhanvar, Ph.D.



Graduate students meeting in a rest
area of EV building

STUDENTS GRADUATED (MASTER & PH.D)

PH.D

Mural Al-Shibli

Thesis Title: Modeling and Control of a Free-Flying Space Robot Interacting with a Target Satellite
 Defence Date: Dec. 16, 2005
 Convocation:
 Supervisors: C.-Y. Su and F. Aghili (CSA)

Kasra Daneshkhah

Thesis Title: Aerodynamic Inverse Design of Turbomachinery Blading in Two-Dimensional Viscous Flow
 Defence Date: Apr. 3, 2006
 Convocation: Spring 2006
 Supervisor(s): W.S. Ghaly

F. Defersha

Thesis Title: An Integrated Approach to the Design of Cellular Manufacturing Systems for Dynamic Production Requirements
 Defence Date: Feb. 27, 2006
 Convocation: Spring 2006
 Supervisor(s): M. Chen

Aurelio Dominguez-Gonzalez

Thesis Title: Design Optimization and Vibration Control of Adaptive Structures
 Defence Date: June 22, 2005
 Convocation: Fall 2005
 Supervisor(s):
 R. Sedaghati and I. Stiharu

Weiping Liu

Thesis Title: Epoxy/Clay Nanocomposites for Structural Applications
 Defence Date: Sept. 2005
 Convocation: Spring 2006
 Supervisor(s): M.D. Pugh and

S.V. Hoa

Gino Rinaldi

Thesis Title: Dynamic Analysis and Validation of Cantilever MEMS Subjected to Electro-Thermo-Mechanical Influences
 Defence Date: April 18, 2006
 Convocation: Spring 2006
 Supervisor(s):
 M. Packirisamy and I. Stiharu

Yasser Saed Aldien

Thesis Title: A Study of Hand-Handle Interactions and Hand-Arm Biodynamic Response to Vibration
 Defence Date: Sep. 23, 2005
 Convocation: Fall 2005
 Supervisor(s): S. Rakheja

En Rong Wang

Thesis Title: Syntheses and Analyses of Semi-active Control Algorithms for a Magneto-Rheological Fluid Damper for Vehicle Suspensions
 Defence Date: Dec. 2, 2005
 Convocation: Spring 2006
 Supervisors: S. Rakheja and C.-Y. Su

M.A.SC.

Mehrad Ahari

Thesis Title: Design Optimization of an Adaptive Laminated Composite Beam with Piezoelectric Actuators
 Defence Date: Aug. 15, 2005
 Convocation: Fall 2005
 Supervisor(s): R. Sedaghati

Haider Al-Kazzaz

Thesis Title: Nd: YAG Laser Welding of Ze41A-T5 Magnesium Sand Casting

Alloy

Defence Date: April 19, 2006
 Convocation: Spring 2006
 Supervisor(s): M. Medraj

Saher Al Shakhshir

Thesis Title: A Computational Thermodynamic Model of the Mg-Al-Y System
 Defence Date: Aug. 29, 2005
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 Supervisor(s): M. Medraj

Jeetender Singh Amritsar Gobind

Thesis Title: Micro Systems for Bio-Enzymatic Reaction Detection
 Defence Date: Nov. 2005
 Convocation: Spring 2006
 Supervisor(s): I. Stiharu

Ifthekhar Anwar

Thesis Title: Automotive Collision Detection System Utilizing Distributed Polyvinylidene-Fluoride Sensors
 Defence Date: Dec. 2005
 Convocation: Spring 2006
 Supervisor(s): A.K.W. Ahmed and J. Dargahi

Seyyedmohsen Azizi

Thesis Title: Distributed Realization of Differential-Algebraic Systems using Decentralized Sliding Mode Control
 Defence Date: Dec. 2005
 Convocation: Spring 2006
 Supervisor(s): B.W. Gordon and V. Ramachandran

Sudantha Balage

Thesis Title: Finite Element Splitting Methods Applied to Incompressible Navier-Stokes Flow Solvers and Introduction to Mixed Mass Method
 Defence Date: April 10, 2006

Convocation: Spring 2006
Supervisor: M. Paraschivoiu

Neil Balan

Thesis Title: Apprehending the Visible: Logistics of Perception and the Aerial Reconnaissance Archive
Defence Date:
Convocation: Fall 2005
Supervisor(s): W. J. Buxtin

Wassim Basha

Thesis Title: Accurate Drag Prediction for Transitional External Flow over Airfoils
Defence Date: Apr. 5, 2006
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Supervisor(s): W.S. Ghaly

Robert Bowden

Thesis Title: Incipience of Two-phase Flow from a Stratified Gas-liquid Region in Multiple Discharging Branches: Experimental Investigation Including PIV Measurements
Defence Date: 2005
Convocation: Spring 2006
Supervisor(s): I. Hassan

Hua Cai

Thesis Title: Incorporating Quantized Mental Workload in Modeling of Driver's Handling
Defence Date:
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Supervisor(s): Y. Lin

Allan Wei Cai

Thesis Title: A Generic, Geometric Approach to Accurate Machining-Error Prediction in 3-Axis CNC Milling of Sculptured Surface Parts
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Convocation: Spring 2006
Supervisor(s): Z.C. Chen

Arvind Chandrasekaran

Thesis Title: SOI Waveguide Based Optical Microsystems for Biophotonic Enzymatic Detection
Defence Date: April 6, 2006

Convocation: Spring 2006
Supervisor(s):
M. Packirisamy and
N. Sivakumar

Ming Bin Chen

Thesis Title: Preliminary Study of Ontology for Systematic Gathering of Product Requirements
Defence Date:
Convocation: Spring 2006
Supervisor(s): Y. Zeng

Mahabubul Alam Chowdhury

Thesis Title: Dynamic Performance of Heavy Vehicles Using Finite Element Method
Defence Date: Apr. 21, 2006
Convocation: Spring 2006
Supervisor(s): A.K.W. Ahmed and R. Sedaghati

Venkata Sundar Kamal Devu

Thesis Title: Modeling a Closed-Loop Product Recovery System with Supply Uncertainty
Defence Date: Oct. 12, 2005
Convocation: Spring 2006
Supervisor(s): M. Chen

Burcu Dolunay

Thesis Title: Virtual Reality Based End-User Assessment Tool for Remote Product/ System Testing and Support
Defence Date: May 1, 2006
Convocation: Spring 2006
Supervisor(s): A. Akgunduz

Habib El Sabbagh

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Convocation: Spring 2006
Supervisor(s): N. Bhuiyan

Tian-Jun Fu

Thesis Title: Speed-Sensorless Torque Control of Induction Motor for Hybrid Electric Vehicles

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Behnood Gholami

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Da-Gang He

Thesis Title: Permanent Magnet Plunger – Bi-directional Solenoid Actuator for Direct Alternative Fuel Injector
Defence Date: Nov. 2005
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Supervisor(s): H. Hong and C.-Y. Su

Md. Forhad Khandaker

Thesis Title: Voice Coil Actuated Variable Valve Timing Systems for Spark Ignition Engines
Defence Date: April 11, 2006
Convocation: Spring 2006
Supervisor(s): H. Hong and L. Rodrigues

Rakesh Kalyanaraman

Thesis Title: Non Linear Dynamic Analysis of Electrostatically Actuated MEMS Structures
Defence Date: June 22, 2006
Convocation: Spring 2006
Supervisor(s):
M. Packirisamy

Mina Khoshnejad

Thesis Title: Fuzzy Logic Based Autonomous Parallel Parking of a Car-like Mobile Robot
Defence Date: Apr 12, 2006
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Supervisor(s): K. Demirli

Louis Lebel Laberge

Thesis Title: Manufacturing of Braided Thermoplastic Composites with Commingled Fibers

Defence Date: May 2005
Convocation: Fall 2005
Supervisor(s): S.V. Hoa

Minmin Le

Thesis Title: DSMC
Simulation of Flows in
Multiple Microchannel
Geometries
Defence Date: Dec. 2005
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Supervisor(s): I. Hassan

Robert Mihael Liegl

Thesis Title: A Full Potential
Solver for Lifting Flows on
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Meshes
Defence Date: Dec. 5, 2006
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Supervisor: M. Paraschivoiu

Bing Xiong Lin

Thesis Title: Optimal Tank
Geometry and Braking and
Steering Response Analysis
of a Tank Vehicle
Defence Date: June 2, 2005
Convocation: Fall 2005
Supervisor(s): S. Rakheja and
I. Stiharu

Weiguang Liu

Thesis Title: Dynamic
Instability Analysis of
Tapered Composite Plates
using Ritz and Finite Element
Methods
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Convocation: Fall 2005
Supervisor(s): R. Ganesan

Virendra Loya

Thesis Title: The Effect of
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Defence Date: Aug. 19, 2005
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David May

Thesis Title: Wing Tip
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Supervisor(s): G.H. Vatistas

**Santosh Chary
Mandapuram**

Thesis Title: Role of Seat
Design Factors and
Biodynamic Characterization
of Seated Occupant under
Horizontal
Defence Date: Aug. 2005
Convocation: Fall 2005
Supervisor(s): S. Rakheja and
S. Ma

Karun Nayyar

Thesis Title: Static and
Modal Analyses of
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Element Method
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Convocation: Spring 2006
Supervisor(s): R. Ganesan

Mehrdad Pakmehr

Thesis Title: Dynamic
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Defence Date: Sept. 2005
Convocation: Fall 2005
Supervisor(s): B. Gordon

Girish Parvate-Patil

Thesis Title: Solenoid
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Defence Date: Apr. 2005
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Reza Pedrami

Thesis Title: Hybrid
Modeling and Simulation of
Rigid Bodies in Contact
Defence Date: Aug. 18, 2005
Convocation: Fall 2005
Supervisor(s): B. Gordon and
A. Akgunduz

**Jose Marco Antonio Pena
Coronel**

Thesis Title: Biodynamic
Characterization of Seated
Occupant Under Horizontal
Vibration
Defence Date: Feb. 2005
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Supervisor(s): S. Rakheja and
J. Dargahi

Zhi Qian Ren

Thesis Title: Optimization of
Real-Time Distributed
Simulation of Multi-Body
Systems
Defence Date: July 2005
Convocation: Fall 2005
Supervisor(s): B.W. Gordon

Amandeep Singh Sandhu

Thesis Title: A Robust
Production System Design
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Methodology
Defence Date:
Convocation: Fall 2005
Supervisor(s): M.Y. Chen

Amid Shakeri

Thesis Title: A Comparative
Study of Occupant Thermal
Modeling
Defence Date: Apr. 28, 2006
Convocation: Spring 2006
Supervisor(s): A. Dolatabadi
and F. Haghighat

Samer Shehab

Thesis Title: Control of a
PWA System Cascaded with
a Nonlinear System: An
Application to a UAV Path
Following Problem
Defence Date: April 11, 2006
Convocation: Spring 2006
Supervisor(s): L. Rodrigues

Seyyed Alireza Tadayoni

Thesis Title: Adaptive
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Defence Date: April 27, 2006
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Supervisor(s): B.W. Gordon
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Thangarajah Thevika

Thesis Title: Thermodynamic
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Defence Date:
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Congyu Wang

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Ruiping Wang

Thesis Title: A Study of Vibration Isolation of Engine Mount System
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Supervisor(s): S. Rakheja and H. Hong

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Shijie Xu

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Wensheng Xu

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Ming Yang

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Hang Yu

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Wei Yue

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Supervisor(s): L. Rodrigues and B. Gordon

Li Zhang

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Supervisor(s): M. Chen

Saeed Zhirifar

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Supervisor(s): M.D. Pugh

Yu-Qing Zhu

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Narayanan Kuralenthi

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Shibli, M., F. Aghili and C.-Y. **Su**, "Modeling of a Free-Flying Space Robot Manipulator in Contact with a Target Satellite", *2005 IEEE Conference on Control Applications*, 2005. (Invited paper, one of four finalists for the CCA05 Best Student-Paper Award)

Siddiqui, K. and M.R. Loewen, "Wave-Turbulence Decomposition", *Canadian Congress of Applied Mechanics*, Montreal, May 30-June 2, 2005.

Sivakumar, N.R., B. Tan and K. Venkatakrishnan, "Determination of Measurement Uncertainty in the Developed Instantaneous Phase Shifting Interferometer", *IODC conference*, Vancouver, June 2006.

Stiharu, I., M. **Packirisamy**, S. Andronenko and H. Moustapha, "MEMS Pressure Sensor for GTE", *ISABE 2005-1215, International Symposium on Airbreathing Engines*, Munich, Germany, Sept. 4-9, 2005.

Srivatsan, V.R., Q. Zhu and A. **Dolatabadi**, "Effect of Substrate Geometry on Thermally Sprayed Coating Particles", *Proceeding of the 17th International Symposium on Plasma Chemistry (ISPC17)*, Paper # ISPC-791, Toronto, Ontario, Canada, August 2005.

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Tadayoni, S.A., B. Gholami and K. **Demirli**, "Vision-Based Fuzzy 2D Motion Control of a Model Helicopter", *NAFIPS 2006 Conference*, Concordia University, Montreal, June 3-6, 2006.

Wang, H., S.V. **Ho** and P. **Wood-Adams**, "A New Method for the Processing of Epoxy/clay Nanocomposites", *Proc. 5th Canadian International Conference*, Vancouver, Canada, August 2005.

Vatistas G.H., Y. Aboelkassem and M.H.K. **Siddiqui**, "On the Space-Time Duality of Intense Vortices", *35th AIAA Fluid Dynamics Conference and Exhibit*, Toronto, Ontario, paper no. AIAA 2005-5159, June 6-9, 2005.

Wang, En-Rong, Xiao-Qing Ma, Subhash **Rakheja** and Chun-Yi **Su**, "Force Tracking Control of Vehicle Vibration with MR-dampers", *2005 IEEE International Symposium on Intelligent Control and 13th Mediterranean Conference on Control and Automation (2005 ISIC-MED)*, Vol. 2, pp. 995-1000, June 27-29, 2005. (ISIC Invited paper)

Wang, Qingqing, Chun-Yi **Su** and Shuzhi Ge, "A Direct Method for Robust Adaptive Nonlinear Control with Unknown Hysteresis", *Proc. of the 44th IEEE Conference on Decision and Control*,

Seville, Spain, December 12-15, 2005.

Xiao, H.M., C.-Y. **Su** and W.F. **Xie**, "Variable Structure Control Based on the Fuzzy Neural Networks", *NAFIPS 2006 Conference*, Concordia University, Montreal, June 3-6, 2006.

Xu, T. and M. **Paraschivoiu**, "A Fast Solver for Large Eddy Simulation", *AIAA*, paper 2005-4696, 2005. (3rd place at the first AIAA CFD student paper competition.)

Yang, X.J. and Z.C. **Chen**, "A Method of NURBS Tool Paths Generation for High Precision Machining of Sculptured Parts," *Proceedings of the ASME International 25th Computers and Information in Engineering Conference*, Long Beach, CA, USA, September 24-28, 2005.

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Yi, X., M. **Chen** and A.A. **Bulgak**, "Manufacturing Facility Layout for Re-manufacturing and Quality Improvement", *Proceedings of the 18th International Conference on Production Research*, Fisciano, SA, Italy, July - August 2005.

Yimer, Alebachew D. and Kudret **Demirli**, "Minimizing Weighted Flowtime in a Two-Stage Flow Shop with Fuzzy Setup and Processing Times", *NAFIPS 2006 Conference*, Concordia University, Montreal, June 3-6, 2006.

You, J., M. **Packirisamy** and I. **Stiharu**, "Analysis, Simulation and Testing of a Compliant Planar Spring for Micromirrors", Poster Session, *4th Canadian Workshop on MEMS, Opportunities and Challenges on the Road to Microsystems Integration*, August 19, 2005.

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You, J., M. **Packirisamy** and I. **Stiharu**, "Modelling of Torsional Micromirrors with Springs made of Multiple Rotational Serpentine Elements", Poster session, *Conf. on Modeling and Simulation of Microsystems, Nanotech 2006*, Boston, Massachusetts, May 7-11, 2006.

You, J., M. **Packirisamy** and I. **Stiharu**, "Study on Symmetrically Supported Electrostatic Actuated Micro-Platform", *SPIE Photonics North conference*, Quebec City, June 5-8, 2006.

Younesian, D., E. Esmailzadeh and R. **Sedaghati**, "Transition Curves for Nonhomogeneous Mathieu Equation", *Proceedings of the IDETC 2005 ASME International Design Engineering Technical Conference*, DETC2005-85170, Long Beach, California, September 24-28, 2005.

Yu, H. and A. **Akgunduz**, "Free Form Sketching in 3D using Uniform Spherical Reference Points", *HCI International 2005*, Las Vegas, USA, July 2005.

Yue, W., L. **Rodrigues** and B.W. **Gordon**, "Piecewise-Affine Control of a Three DOF Helicopter", *American Control Conference*, June 2006.

Zabihollah, A., R. **Ganesan** and R. **Sedaghati**, "Analysis and Design Optimization of Smart Laminated Composite Beams using Layerwise Theory," *III European Conference on Computational Mechanics (ECCM-2006)*, Lisbon, Portugal, June 5-9, 2006.

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Zhao, Q. and S.V. **Hoa**, "Modification of Mechanical Properties of Epoxy Resin with Micro/nano Particles", *Proc. 7th International Mesomechanics Conference*, Montreal, August 2005.

Zhao, Q. and S.V. **Hoa**, "Effects of Particle Size on Stress and Toughness of Epoxy Nanocomposites", *Proc. Polymer Nanocomposites Conference*, Montreal, September 2005.

Zhao, Z.Y., W.F. **Xie** and A.B. Rad, "A Cascaded Fuzzy Model of Friction over Large Temperature Variation", *NAFIPS 2006 Conference*, Concordia University, Montreal, June 3-6, 2006.

Zheng, T.H., G.H. **Vatistas** and A. Povitsky, "Sound Generation by Street of Vortices in a Non-uniform Flow," *35th AIAA Fluid Dynamics Conference and Exhibit*, Toronto, Ontario, paper no. AIAA 2005-5160, June 6-9, 2005.

Zhu, K. and P.M. **Wood-Adams**, "The Activation Energy Spectrum and Thermorheologically Complex Materials", *Annual European Rheology Conference*, Grenoble, France, April 2005.

Zhu, Q. and A. **Dolatabadi**, "Computational Modeling of Cold Spray Process: Effect of Substrate and Particle Size on Gas-Particle Flow", *Proceeding of the International Thermal Spray Conference and Exposition*, Seattle, Washington, May 15-18, 2006.

Zhu, Y.Q., W.F. **Xie** and Ning Wang, "Nonlinear System Identification Using Genetic Algorithm based Recurrent Neural Networks", *Canadian Conference on Electrical and Computer Engineering*, May 7-10, 2006.

OTHER RESEARCH PUBLICATIONS – CONFERENCE PRESENTATIONS

Cree, D. and M.D. **Pugh**, "Ceramics Produced From Wood", *Conference of Canadian Aboriginal Science and Technology Society*, Sydney, Nova Scotia, September 2005.

Liu, W.P., S.V. **Hoa** and M.D. **Pugh**, "Augmentation of Fracture Toughness of Modified Epoxy Using Nanoclay", *5th Canada-Japan Workshop on Composites*, Yamagata, Japan, September 6-8, 2004.

Liu, W.P., S.V. **Hoa** and M.D. **Pugh**, "Epoxy-Clay Nanocomposites: Dispersion, Morphology and Performance", *TNT 2004 'Trends in Nanotechnology'*, Segovia, Spain, Sept 13-17, 2004.

Liu, W.P., S.V. **Hoa** and M.D. **Pugh**, "Fracture Toughness and Hydrothermal Properties of High Performance Epoxy-Clay Nanocomposites", *American Society for Composites Conference*, Philadelphia, September 2005.

Liu, W.P., S.V. **Hoa** and M.D. **Pugh**, "Fracture Toughness and Hydrothermal Properties of Epoxy Nanocomposites Modified with Nanoclay and Rubber", *Nanocomposites 2004*, San Francisco, California, Sept. 1-4, 2004.

McQueen, H.J., “Modern History of Petroleum Pipelines: Fabrication”, Historical Metallurgy Lecture, *Metallurgical Society CIM*, Calgary, August 2005.

McQueen, H.J., “The Victoria Bridge: 1859 Tubular Wrought Iron; 1898 Steel Truss”, *McGill Metal Processing Center*, December 2005.

OTHER RESEARCH REPORTS

Packirisamy, M., I. Stiharu, L. Poulin and A. Darveau, “Development of Microfluidic Chip for Hybrid Attachment to Spectrometer on Chip: Milestone 1 report”, submitted to Valeo Gestion, March 14, 2005.

Packirisamy, M., I. Stiharu, L. Poulin and A. Darveau, “Development of Microfluidic Chip for Hybrid Attachment to Spectrometer on Chip: Milestone 2 report”, submitted to Valeo Gestion, June 1, 2005.

Packirisamy, M., I. Stiharu, L. Poulin and A. Darveau, “Development of Microfluidic Chip for Hybrid Attachment to Spectrometer on Chip: Final report”, submitted to Valeo Gestion, March 15, 2006.

Sridhar, C. and R. Sedaghati, “Wing–Box Structural Design Optimization”, Report 3, provided for *CRIAQ-MOSAIQ*, task 6, October 2005.

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INVITED LECTURES AND SEMINARS

Bhuiyan, N., Invited as a delegate at a symposium ‘Leaders in Innovation’ highlighting Canada's outstanding younger innovators, organized by the *Partnership Group for Science and Engineering (PAGSE)*, an association of national organizations in science and engineering, March 30, 2006.

Hoa, S.V., “Activities on Composites in Canada”, Invited Plenary address, *American Society for Composites Annual Conference*, Drexel University, Philadelphia, September 2005.

Hoa, S.V., “Development of Epoxy Nanocomposites”, Invited address, *Department of Chemical Engineering*, West Virginia University, October 2005.

Hoa, S.V., “Epoxy Nanocomposites with High Fracture Toughness”, Invited address, *Harima International Forum*, Hyogo Prefecture, Japan, January 2006.

Hoa, S.V., “Survivability of Composite Wing Box”, Invited address, *Carrefour de matériaux de pointes*, Industrial Materials Institute, National Research Council Canada, April 2006.

Jasiuk, I. “Damage in Biological Materials,” *2005 ASME International Mechanical Engineering Congress & Exposition*, Orlando, FL, November 2005.

Jasiuk, I., "Couple-Stress Moduli of 3-D Cellular Networks," *McMat2005 (The 2005 Joint ASCE/ASME/SES Conference on Mechanics and Materials)*, Baton Rouge, LA, June 2005.

Jasiuk, I., "Modeling of Normal vs. Osteoporotic Trabecular Bone," *McMat2005 (The 2005 Joint ASCE/ASME/SES Conference on Mechanics and Materials)*, Baton Rouge, LA, June 2005.

Jasiuk, I. "Modeling of Trabecular Bone as a Hierarchical Structural Material", Invited Seminar, *Department of Civil and Environmental Engineering, Concordia University*, February 2006.

Jasiuk, I., "Trabecular Bone as a Hierarchical Material: Elasticity and Fracture," *2005 Summer Bioengineering Conference*, Vail, CO, June 2005.

Medraj, M., "New Phases in the Mg-Al-Sr System", *THERMEC '2006*, Vancouver, July 4-8, 2006.

Paraschivou, M., "Evaluating the Numerical Error in Finite Element Simulations: The Output Bounds Methods", *Seminar Series, Department of Mechanical Engineering, University of Alberta*, October 6, 2005.

Rakheja, S., "Advances in Tank Truck Safety Dynamics", *2006 SAE World Congress and Exposition*, Detroit, MI, Keynote address, April 2006.

Rodrigues, L., "Uninhabited Aerial Vehicles", *Aerospace and Aviation Concordia*, invited lecture, April 28, 2006.

Siddiqui, K., "Flow Dynamics in Near-Interfacial Regions", *Boundary Layer Wind Tunnel Laboratory & Mechanical and Materials Engineering Seminar Series, University of Western Ontario*, February 22, 2006.

Wood-Adams, P., "Measuring Local Viscoelastic Properties of Complex Materials with Atomic Force Microscopy and Nanoindentation", *Department of Mechanical Engineering, University of Alberta*, September 2005.

FUNDED RESEARCH SUPPORT

LEGEND: ABBREVIATIONS USED IN THE TABLE BELOW

ANAF	Anonymous Associations, Foundations, Canadian
ANOC	Anonymous Companies, Corporations, Canadian
ANON	Anonymous Companies, Corporations, Non-Canadian
AUTO21	An automotive engineering Network of Centres of Excellence
AUAF	Academic User Access Facility (a type of NSERC fund)
BELLH	Bell Helicopter Textron
BOMC	Bombardier Company
BOMBA	Bombardier Aerospace
C	Contract

CAE	CAE Inc.
CANMET	National Resources Canada (Mines, Energy, Technology)
CARA	Committee to Aid Research Activity (President's NSERC Grant) – Concordia U.
CARM	Carminex
CASA	Concordia Aid to Scholarly Activity
CCMTA	Canadian Council of Motor Transport Administrators
CDOT	Canada Department of Transport
CERCA	Centre de Recherche en Calcul Appliqué
CFI	Canadian Foundation for Innovation
CGA	Canadian Gas Association
CHRP	Collaborative Health Research Project
CIDA	Canadian International Development Agency
CIHR	Canadian Institute for Health Research
CMC	CMC Electronics Ltd.
CMEC	Canadian Microelectronic Corporation
CONCAM	Concordia Centre for Composites and Materials
Con U	Concordia University
CPFDUA	CPF Dualam Inc.
CRIAQ	Consortium de recherche et d'innovation en aérospatiale au Québec
CRC	Concordia Research Chair
CRD	Colaborative Research and Development grants programme (NSERC)
CS	Consulting
CSA	Canadian Space Agency
DEAN	Dean of Faculty of Engineering and Computer Science – Concordia University
DELAS	Delasted Ltd.
DOWCH	Dow Chemical Company of Canada
DRDC	Defense Research and Development Canada
E	Equipment
EMRC	Energy, Mines, & Resources Canada
ECS	Engine Control Systems Ltd.
ENCS/FA	Seed Funding, jointly between the Faculties of Engineering and Computer Science and Fine Arts, intended to support the project while alternative external funding application is being made to further develop and bring the project to maturity.
FCAR	Fonds pour la formation de chercheurs et l'Aide à la Recherche
FAIT	Ministry of Foregin Affairs and International Trade, Canada
FDI	Fluid Dynamics International
FESTO	Festo Inc.
FRDP	Concordia University – Faculty Research Development Program
FRSP	Faculty Research Support Grant
FERIC	Institut Canadien de Recherche en Génie Forestier
FQRNT	Le Fonds québécois de la recherche sur la nature et les technologies
GBTII	Green Biomed Technology Instruments Institute
GHGP	Greenhouse Gas Mitigation
GM	General Motors Corporation - USA
GMC	General Motors Corporation - Canada
GM-TG	General Motors Corporation USA – Truck Group
GOVQUE	Government of Quebec
GV	Gestion Valeo s.e.c., Consultant en valorisation
HARFAR	Harris Farinon
HEM	Hardt Equipment Manufacturing
HYDRO	Hydro-Québec
IC	Intempco Controls
INFRA	Infrastructure grant – Concordia University
IOR	NSERC Industrially Oriented Research (replaced by Collaborative Research Grants)

IRIS	Institute for Robotics and Intelligent Systems – one of the centers in the National Centers of Excellence (NCE) Program
IRSST	Institut de recherche sur la santé et sécurité au travail
ISIS	Intelligent Sensing for Innovative Structures
KNOED	Knoedler Corporation
LEAR	Lear Seating Corporation
M	Miscellaneous
MECSYS	Mechtronix Systems Inc.
MAIA	Minister of International Affairs and Immigration
MOSAIC	Multidisciplinary Optimization Standardization Approach for Integration and Configurability
MPBT	MPB Technologies
MRI	Ministère des Relations Internationales
MRST	Ministère de la Recherche, de la Science, et de la Technologie (formerly MESS)
MTQ	Ministère des Transports du Québec
NATEQ	Fonds Québécois de la Recherche sur la Nature et les Technologies (formerly FCAR)
NANO-Q	Nano-Québec
NATO	North Atlantic Treaty Organization
NATRES	Natural Resources Canada
NCE	Network of Centres of Excellence
NETE	Naval Engineering Test Establishment
NFDE	New Faculty Development Equipment Grant – Concordia University
NIOSH	National Institute of Occupational Safety and Health, USA
NRC	National Research Council of Canada
NRC/CANMET	Natural Resources Canada/CANMET
NSERC	Natural Sciences & Engineering Research Council
O	Operating
PAPRICAN	Pulp and Paper Research Institute of Canada
PETROC	Petro Canada
PREVC	Prevost Car
PWC	Pratt and Whitney Canada
RITE	Ritepro Inc.
RTI	Research Tools and Instruments (and Infrastructure Programs of NSERC) [previous “Equipment” grant]
S	Strategic Research Grant
SAAQ	La Société de l'assurance automobile du Québec
Scyform	Scyform company
SEAG	Seagram Grant for Academic Innovation
SPARC	SPAR Aerospace Canada
SRT	Concordia University Faculty Program in Support of Research Theses (SRT) grant
TANKCON	Tankcon FRP Inc.
TDC	Transport Development Centre, Transport Canada
TDG	Teaching Development Grant – Concordia University
TERTL	Thermal Energy Retrieval (Trucks) Ltd.
TESL	Thermal Energy Systems Ltd.
TITFER	Compagnie Fer et Titane du Québec Ltée.
TKTRF	Taiho Kogyo Tribology Research Foundation
TRG	Tectonics Research Group Inc.
UOIT	University of Ontario Institute of Technology
USCAR	United States Council for Automotive Research
VIA	Via Rail Canada Inc.
WEIR	Weir Canada
WSPGC	Work Study Project Grant – Concordia University

SUMMARY OF FUNDED RESEARCH SUPPORT 2005-2006

Ordered alphabetically ascending by last name of principal investigator

<u>PRINCIPAL INVESTIGATOR</u>	<u>YEAR(S)</u>	<u>PROJECT TITLE</u>	<u>AGENCY</u>	<u>TYPE</u>	<u>AMOUNT</u>
Ahmed, A.K.W.	2001-2006	Fundamental and Application Research on Mechanical Systems with special emphasis on Guided and Non-guided Vehicles	NSERC	O	22,000/yr
Akgunduz, A.	2003-2008	Evaluation of Sub-component Alternatives in Product Design using Virtual Reality Prototyping - Discovery	NSERC	O	17,000/yr
Akgunduz, A. (P.I.), Rivard, H. (ETS), and Ozell, B. (Polytechnique)	2006-2007	Virtual Design Room: Intelligent Information Processing System for Virtual Reality Based Collaborative Design Review Process	CRIAQ	O	96,256/yr
Akgunduz, A. (P.I.), et. al.	2006-2007	Virtual Reality-Based Free-form Sketching System	NSERC	E	17,500
Bhat, R.B.	2005-2007	Dynamic Behaviour of Mechanical Systems - Discovery	NSERC	O	28,000
Bhat, R.B.	2003-2007	Dynamic Analysis and Design of Mechanical and Micromechanical Systems including Rotating Components	NSERC	O	28,000/yr
Bhuiyan, N.	2004-2007	Amélioration de processus de développement de nouveaux produits - Établissement de nouveaux chercheurs	NATEQ	O	15,500/yr
Bhuiyan, N.	2004-2007	Concurrent Engineering Approach of Aircraft/Flight Simulator Product Development.	BOMBA	C	T.B.A.

<u>PRINCIPAL INVESTIGATOR</u>	<u>YEAR(S)</u>	<u>PROJECT TITLE</u>	<u>AGENCY</u>	<u>TYPE</u>	<u>AMOUNT</u>
Bhuiyan, N.	2003-2007	New Product Development (NPD): Tools and Techniques for Improving Processes - Discovery	NSERC	O	14,000/yr
Bhuiyan, N., Salam, A.	Jan. 2006 – Dec. 2006	TC Cert Report Consolidation and Ancillary Tasks	PWC	C	21,388
Bocher, P. (P.I.) and Medraj, M.	2005-2009	Development of Brazing Process Applied to Martensitic, Austenitic Stainless Steels and Nickel Superalloys	CRIAQ	O	316,248
Bulgak, A.A.	2005-2006	Integrated Designs for Globally Competitive and Environmentally Responsible Manufacturing/Assembly Systems	NSERC	O	17,000/yr
Carreau, P., Hoa, S.V., + 45 others	2004-2008	Center for Research in Polymers and Composites	FQRNT	O	450,000/yr
Chen, M.Y.	2004-2009	Manufacturing Systems Analysis for Quality Improvement and with Environmental Considerations	NSERC	O	23,000/yr
Chen, M.Y.	2006	Supply Chain Management for New Engine Product	PWC	C	45,000/yr
Chen, Z.C., Vadean, A.	2006-2008	Product Design Optimization with Integration of Computational Tools	CRIAQ, NSERC, PWC, Scyform	C	350,000
Chen, Z.C.	2003-2007	Automatic and Intelligent Programming for Sculptured Parts - Discovery	NSERC	O	17,000/yr
Dargahi, J.	2006-2011	Micromechatronics in Surgery: Haptic Sensors and Feedback Systems in Minimally Invasive Surgery and Robotics - Discovery	NSERC	O	19,000/yr
Dargahi, J.	2006	Tissue Testing Equipment	NSERC-RTI	E	115,000

<u>PRINCIPAL INVESTIGATOR</u>	<u>YEAR(S)</u>	<u>PROJECT TITLE</u>	<u>AGENCY</u>	<u>TYPE</u>	<u>AMOUNT</u>
Dargahi, J.	2006	A Smart Endoscopic Grasper for Minimally Invasive Surgery - Precarn T-Gap grant	IRIS	O	60,000
Demirli, K.	2004-2009	Fuzzy Logic for Intelligent Distributed Mobile Robots	NSERC	O	19,560/yr
Demirli, K.	2005-2007	Neuro Fuzzy Systems for Intelligent Inspections in Manufacturing Processes	AUTO21	O	18,000/yr
Dolatabadi, A.	2005-2010	Analysis of Two-phase Flows for Spraying Processes	NSERC-DG	O	22,200/yr
Dolatabadi, A.	2005-2008	Analyse de l'écoulement de particules denses dans les processus de vaporisation	NATEQ	O	14,540/yr
Dolatabadi, A.	2006-2007	Upgrade to Phase Doppler Particle Analyzer	NSERC-RTI	E	26,050
Dolatabadi, A.	2005-2006	Analyse de l'écoulement de particules denses dans les processus de vaporisation	NATEQ	E	50,000
Dolatabadi, A.	2005-2006	Imaging Based Spray Diagnostic System	NSERC-RTI	E	35,940
Esmail, N.	2003-2008	Hydrodynamics and Rheology of Thin Layers and Micro-flows - Discovery grant	NSERC	O	25,000/yr
Ganesan, R.	2001-2006	Concordia Research Chair in High Performance Composite Structures and Machine Components	CONU	O	15,000/yr
Ganesan, R.	2002-2007	Dynamic Response and Stochastic Mechanics of Composite Materials and Structures	NSERC	O	15,000/yr
Ganesan, R., and 3 other P.I.'s	2004-2007	A New Head Mounted Display System for Use in 3D Virtual Art Exhibitions - New Media Initiatives	NSERC	E	425,000/yr

<u>PRINCIPAL INVESTIGATOR</u>	<u>YEAR(S)</u>	<u>PROJECT TITLE</u>	<u>AGENCY</u>	<u>TYPE</u>	<u>AMOUNT</u>
Gakwaya, Augustin (Laval University) (P.I.), Associate investigators: Rajamohan Ganesan (Concordia), Dennis Nandlall (RDDC), James Nemes (McGill), David Zimck (IRA/NRC).	2004-2007	Impact Modelling of Composite Aircraft Structures	CRIAQ	C	503,125
Ghaly, W.S.	2003-2007	Simulation-Based Aerodynamic Design and Shape Optimization of Gas Turbine Blading	NSERC	O	19,450/yr
Ghaly, W.S.	2005	Turbine Exhaust Loss Modeling	PWC	C	24,680
Gordon, B.W.	2005-2007	Synthesis and Implementation of Single and Multi-vehicle Systems Guidance Based on Nonlinear Control and Optimization Techniques	DRDC	C	79,000
Gordon, B.W.	2002-2006	A Distributed Computing Environment for Real-time Simulation of Mechanical Systems: Aerospace and Automotive Applications	CFI	E	116,000
Gordon, B.W.	2004-2009	Simulation and Control of Mechanical Systems using Distributed Computing Networks	NSERC	O	23,000/yr
Haghighat, F., Ghaly, W.S. , and 3 others	2005	Integrating Environmentally Responsive Elements in Buildings	NSERC	O	153,500
Hassan, I.	2005-2009	Thermal Issues in Micro Scale Systems	NSERC	O	115,000
Hassan, I.	2004-2006	Novel Cooling Schemes for 'Next Generation' Aircraft Engines; and to Develop Micro-Scale Devices Thermal Microsystems - Infrastructure	CFI / PWC	O	51,548

<u>PRINCIPAL INVESTIGATOR</u>	<u>YEAR(S)</u>	<u>PROJECT TITLE</u>	<u>AGENCY</u>	<u>TYPE</u>	<u>AMOUNT</u>
Hassan, I.	2005-2006	Establishing a Heat Transfer Facility for Aero Engine Cooling Investigations	PWC	E	93,000
Hoa, S.V. (Co-Director), Carreau, P. (Director), Pugh, M.D., and 44 others	2004-2009	Quebec Center for Polymers and Composites - Regroupement Strategiques	NATEQ	O	450,000/yr
Hoa, S.V., Trueman, C., Carreau, P.	2006-2009	Development of Carbon/Epoxy Composites with High Electrical Conductivity and EMI Shielding Effectiveness - CRD grant	NSERC, CRIAQ, BELLH, DELAS	O	450,000/yr
Hoa, S.V., Ngo, A.D.	2004-2008	Thermoplastic Composites Aerospace Components	CRIAQ, BELLH, BOMBA	C	450,875
Hoa, S.V.	2004-2007	Support for Technical Professional	CRIAQ	C	80,000
Hoa, S.V.	2001-2007	Research Chair on Materials and Composites	CONU	O	40,000/yr
Hoa, S.V. and Merle, P.	2005-2006	Self Healing Materials	MPBT and CSA	C	23,000
Hoa, S.V. (P.I.) and 7 others	2005-2006	Nanocomposites	NANO-Q	O	56,000
Hoa, S.V. (P.I.), Packirisamy, M., Pugh, M.D., and 7 others	2005	Nanocomposites	NANO-Q	E	39,000
Hoa, S.V.	2005-2006	Durability of Polymer Interfaces (Interface problems between composite reinforcements and concrete)	NCE - ISIS	O	30,000/yr
Hoa, S.V.	2001-2006	Viscoelastic Systems – Discovery	NSERC	O	56,000/yr
Hoa, S.V.	2005-2006	Nanocomposites	GV	C	10,000
Hoa, S.V.	2003- Aug 2005	Survivability of Composites Bonded Wing Box	CRIAQ	C	236,053
Hoa, S.V.	2004- Aug 2005	Thermoplastic Composites Molding	CRIAQ	C	30,000

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Hoa, S.V. and Ganesan, R.	2004- Aug 2005	Surface Finish for Automotive Composites – (AUTO21) – Networks of Centres of Excellence	NCE	O	23,400
Hong, H.	2005-2010	Magnetic-Core Solenoid Actuated Variable Valves and Alternative Fuel Injectors for Automotive Engines	NSERC	O	21,000/yr
Hong, H. (P.I.), Bhuiyan, N., Saad, M., Akhrif, O.	2004-2007	Dynamic Test Bed for Flight Management System	CRIAQ	O	78,792/yr & 935,377 in-kind
Hong, H.	2004-2006	Development of an Automated System Identification, Dynamic Design, and Performance Verification Methodology for Gas Turbine Engine Control Systems	PWC	C	26,071/yr
Hong, H.	2004-2006	Parameterization Methods for Dynamic Design of Gas Turbine Engine Control Systems	PWC	C	26,071/yr
Jasiuk, I. (P.I.)	2004-2007	Modeling of Bone as a Hierarchical Materials	NSERC	O	23,500/yr
Jasiuk, I. (P.I.), and Hoa, S.V.	2004-2006	Nanomechanical Testing of Biomaterials and Nanomaterials	NSERC	O	149,500
Lin, S.	2002-2006	Transport Phenomena and their Applications	NSERC	O	17,000/yr
McQueen, H.	2005-2008	Hot Working of Solute and Precipitate Alloys and Composites - Discovery	NSERC	O	28,000/yr
Medraj, M.	2003-2008	Experimental Investigation and Thermodynamic Modeling of Magnesium Alloy Systems	NSERC	O	18,000/yr
Medraj, M.	2006-2007	Experimental Investigation and Thermodynamic Modeling of the Mg-Al-Ca-Sr Quaternary System	NSERC-AUAF	O	60,266

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Medraj, M.	2003-2006	Magnesium Alloy Phase Diagrams – Thermodynamic Modeling and Experimental Investigation	NATEQ	O	15,000/yr
Sivakumar, N. (P.I.)	2004-2009	Research Chair in Laser Metrology and Micromachining	CRC	O	100,000/yr
Sivakumar, N. (P.I.)	2004-2006	Infrastructure for Laser Metrology and Micromachining	CFI & Que. Govt.	O	100,000/yr
Packirisamy, M.	2003-2007	Design, Modeling and Testing of Microsystems - Discovery	NSERC	O	16,000/yr
Packirisamy, M.	2003-2007	ConSiM (Concordia Silicon Microfabrication Facility - New Opportunities Fund	CFI	O	1,056,090
Packirisamy, M. (co-P.I.) and Stiharu, I. (co-P.I.)	2004-2006	Development of BioPhotonics Chip	GV	O	475,000
Packirisamy, M.	2003-2006	Design, Development and Testing of Integrated PVDF MEMS Devices for Optical Applications	NATEQ	O	14,840/yr
Bénard, P., Paraschivoiu, M., et al.	2005-2007	Hydrogen Safety and Infrastructure Study for Hydrogen Powered Vehicles - Powertrains, Fuels and Emissions - Auto 21	Auto 21–NCE	O	124,500/yr
Paraschivoiu, M., Ghaly, W., Botez, R., Mateescu, D.	2004-2007	Integration of Real-Time Flight Simulation and Computational Fluid Dynamics	CRIAQ	O	255,875 128,225 113,275
Paraschivoiu, M.	2004-2007	Development of Simulation Tools for the Design of Vibro-acoustic Systems - Nouveaux Chercheurs	FQRNT	O	15,400/yr
Paraschivoiu, M.	2002-2007	Bound-Based Methods for Compressible and Turbulent Flows - Discovery	NSERC	O	25,450/yr

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Sullivan, P.E. (P.I.), Paraschivoiu, M., Paraschivoiu, I.	2003-2006	Analysis and Design of Small Wind Turbines for Building Roofs - Strategic Project-NRC and GHGP	NSERC	O	100,000 97,000 100,500
Paraschivoiu, M.	2006	Computational Fluid Dynamics Simulations of Flow Distribution Systems	ECS	C	20,000
Paraschivoiu, M.	2003-2005	Validation and Implementation of an Acoustic Simulation for Mufflers	ECS	C	20,000/yr
Pugh, M.	May 2006 - 2011	Novel Composite Reinforcements - Discovery	NSERC	O	18,585
Rakheja, S.	2003-2007	Analysis of Mechanical Systems with Special Reference to Vehicle Systems; Human Vibration	NSERC	O	35,000/yr
Rakheja, S. (P.I.), Ahmed, A.K.W., Hong, H., Richard, M.J., Sedaghati, R. and Su, C.Y.	2003-2006	Les progrès dans la technologie du véhicule intégrée et de l'ergodynamique / Advances in Integrated Vehicle Technology and Ergodynamics	NATEQ / MTQ	O	40,000/yr
Rakheja, S. (P.I.), Ahmed, A.K.W., Hong, H., Richard, M.J., Sedaghati, R. and Su, C.Y.	2003-2006	Les progrès dans la technologie du véhicule intégrée et de l'ergodynamique	NATEQ	E	41,000/yr
Rakheja, S. (P.I.), Ahmed, A.K.W., Richard, M.J., Stiharu, I.	2003-2006	Prototype development and performance benefit analysis of optimal tank geometry	NSERC	O	147,700
Rakheja, S. (P.I.), Stiharu, I., et al.	2002-2006	Control of hand-transmitted vibration to reduce occupational health risks among power hand tools operators - Collaborative Health Research Project	NSERC	O	218,000

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Rakheja, S. (P.I.), Boileau, P.-E., Su, C.-Y., Ma, S., Demont, R. and Dickey, J.	2005-2008	Musculoskeletal Loading of Seated Occupational Drivers Exposed to Whole-body Vibration - CHRP	NSERC - CIHR	O	90,000/yr
Rakheja, S.	2005-2006	Feasibility Assessment of Central Tire Inflation System for Urban Buses	TDC	C	63,115
Rakheja, S.	2005-2006	Vibration and Shock Analysis of a Canadian Coast Guards Boat	WEIR	C	35,040
Rakheja, S., Boileau, P.-E.	2004-2005	Assessment of Anthropodynamic Manikins for Seating Dynamics Applications	IRSST	O	67,500
Rodrigues, L.	2004-2009	Computer Aided Controller Design for Sampled-Data Piecewise-Affine Systems - Discovery	NSERC	O	20,370/yr
Rodrigues, L.	2005-2008	Systèmes de commande décentralisés affine par secteur (Decentralized Piecewise-Affine Control Systems) -Nouveaux chercheurs	NATEQ	O	14,540/yr
Sedaghati, R.	2006-2010	Optimum Design and Vibration Suppression of Large Flexible Smart Structures	NSERC	O	22,000/yr
Sedaghati, R.	2005-2006	Adaptive-Passive Vibration Control of Time-Varying Structures	UOIT	O	13,500
Sedaghati, R.	2003-2006	Dynamique et controle des vibrations dans les structures souples adaptives / Dynamic and Vibration Control of Flexible Structures - Établissement de nouveaux chercheurs	NATEQ	O	15,000/yr

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Sedaghati, R.	2003-2006	Dynamique et controle des vibrations dans les structures souples adaptives / Dynamic and Vibration Control of Flexible Structures - Établissement de nouveaux chercheurs	NATEQ	E	49,933
Sedaghati, R. (P.I.), Bhat, R.B.	2005-2006	Feasibility Study of OUTPUT-Only Modal Testing for On-Orbit Application	CSA	C	11,200
Sedaghati, R.	2002-2006	Structural Design Optimization of Large Adaptive Space Structures	NSERC	O	18,000/yr
Sedaghati, R.	2004-2006	Wing-box Structural Design Optimization (CRIAQ-MOSAIC Project-Task 6)	BOMBC	C	114,720
Siddiqui, K. (P.I.), Vatishtas, G., Dolatabadi, A.	2005-2006	Dual Wavelength YAG Laser for Simultaneous Velocity and Temperature Measurements	NSERC-RTI	O	72,433
Siddiqui, K.	2003-2007	Experimental and Numerical Investigation of Interface Heat Transfer Mechanisms - Discovery	NSERC	O	19,000/yr
Stiharu, I. (P.I.), Packirisamy, M., Rakheja, S., Bhat, R.B., Narayanswamy, Sivakumar	2006	Optical Vibrometer for MEMS Dynamic Characterization - RTI category 1	NSERC	E	147,748
Stiharu, I. (P.I.), Packirisamy, M. (co-P.I.)	2004-2006	MEMS for Control and Monitoring of Gas Turbine Engines	CRIAQ	C	789,188
Stiharu, I.	2004-2006	Design, Modeling, Analysis and Testing of MEMS with applications in IVS - Discovery	NSERC	O	44,000/yr
Stiharu, I. (P.I.), Bhat, R.B., Packirisamy, M., Dargahi, J.	2003-2006	Evaporator for E-Beam Gun	NATEQ	E	40,000

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Su, C.-Y.	2003-2007	Robust/Adaptive Control of Underactuated Mechanical Systems - Discovery	NSERC	O	23,850/yr
Su, C.-Y.	2001-2006	Concordia Research Chair in Intelligent Control of Non-Smooth Dynamic Systems - Stipend	ENCS	O	15,000/yr
Su, C.-Y.	2004 to Sep. 2005	A Zero-g Emulation Testbed for Spacecraft Control Systems	CSA	C	21,000/yr
Su, C.-Y.	2004 to Sep. 2005	Proof of Concept of A Zero-g Emulation Testbed for Spacecraft Control Systems	CSA	C	22,000/yr
Sullivan, P.E. (P.I.), Paraschivoiu, M., Paraschivoiu I.	2003-2006	Analysis and Design of Small Wind Turbines for Building Roof	NSERC	O	100,000/yr
Trepanier, J.-Y., Ghaly, W., and 6 others.	May 2003 -Dec 2006	MOSAIC	CRIAQ	C	250,000/yr
Trochu, F. (P.I.), AitKadi, A., Benmokrane, B., Boukhili, R., Ganesan, R., Hoa, S.V., Kahrizi, M., Labossière, P., Landsberger, L., Lessard, L., LevanMao, R., Neale, K., Nemes, J., Ngo, A.D., Nollet, M.-J., Perreault, C., Pugh, M., Shao, Y., Stiharu, I., Theriault, M., Wood-Adams, P.	2004-2009	Reseau Québécois sur les matériaux composites d'avant-garde - Regroupement stratégiques	FQRNT	O	2,750,000
Vatistas, G.H.	2002-2006	Theory and Applications of Vortex Dominated Flows	NSERC	O	21,850/yr

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Wood-Adams, P. (P.I.), Dolatabadi, A., Medraj, M., Esmail, N., Stiharu, I.	2006-2009	Une technique d'électromouillage pour le transport de gouttelettes biologiques dans les microcanaux (Electrowetting-based Actuation of Discrete Droplets of Model Biological Fluids in Microchannels) - Team grant	NATEQ FQRNT	O	50,000/yr
Wood-Adams, P. (P.I.), Dolatabadi, A., Medraj, M., Esmail, N., Stiharu, I.	2006-2007	Parylene Deposition System - Team equipment grant	NATEQ	E	28,099
Wood-Adams, P.	2004-2008	Molecular Characterization and Modeling of Physical Properties of Polymers - Discovery	NSERC	O	25,600/yr
Wood-Adams, P.	2005-2006	Rheology and Interfacial Phenomena of Highly Filled Propylene-Ethylene Copolymers - CRD	NSERC	O	65,000
Wood-Adams, P.	2005-2006	Novel VERSIFY* Plastomers and Elastomers and AFFINITY* Polyethylenes in Highly Filled Applications	DOWCH	C	23,500/yr
Wood-Adams, P. (P.I.) and Dolatabadi, A.	2005	Electrorheological and Small Angle Light Scattering Devices	NSERC-RTI	E	70,500
Wood-Adams, P.	2005	Development of Foaming Technology for Polylactide -Young Innovator Award	PETROC	O	2005
Wood-Adams, P.	2005	Length Scales in the Nanoindentation of Polymer Films	TKTRF	O	29,000
Wood-Adams, P.	2004-2006	NSERC University Faculty Award Salary	NSERC	O	40,000/yr

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Xie, W.F.	2003-2008	High Precision Control of Imperfect Actuator over Wide Environment Range - Discovery	NSERC	O	20,300/yr
Xie, W.F.	2005	High Precision Control of Imperfect Actuator Over Wide Environment Range	NSERC-RTI	E	26,374



**An external upwards view of the amazing
EV building**